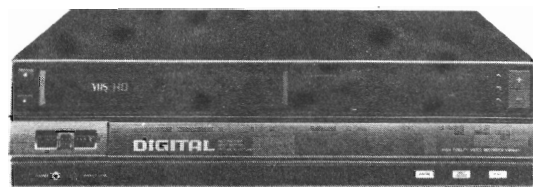


Service
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44 201 A11

Service Manual

VHS

PAL

VR6943/00A/02A Is a video cassette recorder with a TV-reception part and electronic timer, suitable for recording and playing back TV signals, which meet the CCIR-PAL B.G. standard.
The signals are recorded on tape according to the VHS standard.

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Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

SPECIFICATIONS

Format: VHS PAL standard
Video recording system: Two rotary-head helical scan system
Video signals: PAL colour and B/W signals, 625 lines
Recording/playing: 8 hours max. with 240 tape
Tape width: 12.7 mm
Tape speed: SP 23.39 mm/sec.
LP 11.70 mm/sec.
Antenna: 75 Ω unbalanced
Receiving channel: UHF channel 21 - 69
VHF channel 2 - 12
S1 - S41
RF converter output signal: UHF channel 30 - 39 (adjustable). Preset to CH 36
Power requirement: AC 220 V, 50 Hz
Power consumption: Approx. 51 W (with antidew heater)
Operating temperature: 5°C to 40°C
Storage temperature: -20°C to 55°C
Weight: 9.3 kg
Dimensions: 430 mm (W) x 388 (D) x 115 mm (H)
Video
Input: 1.0 Vp-p, 75 Ω
Output: 1.0 Vp-p, 75 Ω
Audio 0 dB = 0.775 Vrms
Input: Line: -3.8 dB, more than 50 k Ω (at 21 pin terminal)
Output: Line: -3.8 dB, less than 1 k Ω (at 21 pin terminal)
Accessories included: Antenna 75 Ω coaxial connector cable (plug provided)
Operation manual
Remote control unit
• UM-4 dry battery (1.5 V) x 2 pcs.
• Audio cable (RCA-pin type)

* As part of our policy of continuous improvement, we reserve the right to alter design and specifications without notice.

Note: The antenna must correspond to the new standard DIN 45325 (IEC 169-2) for combined VHF/UHF antenna with 75 Ω connector.

ADJUSTMENT, REPLACEMENT, ASSEMBLING, AND TOOLS NECESSARY FOR MECHANICAL ADJUSTMENT






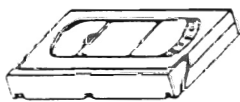
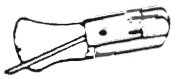


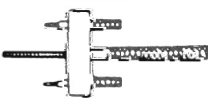





• Outline

Periodical maintenance is necessary for efficient operation. In some instances field service may be achieved with common tools. More extensive service will

require special tools and test equipment. Appropriate tools should be used at all times.

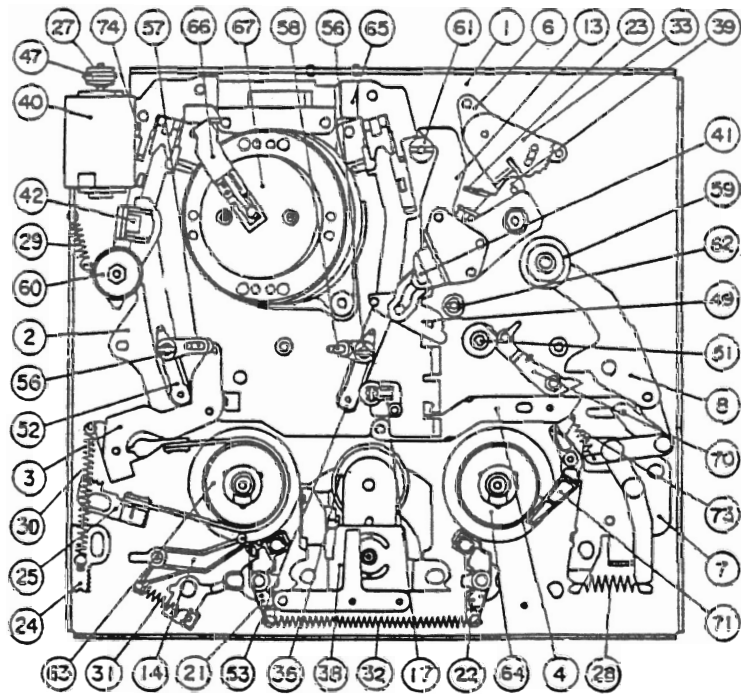
TOOLS NECESSARY FOR ADJUSTING THE MECHANICAL UNITS

The following tools are recommended for proper service and satisfactory repair.

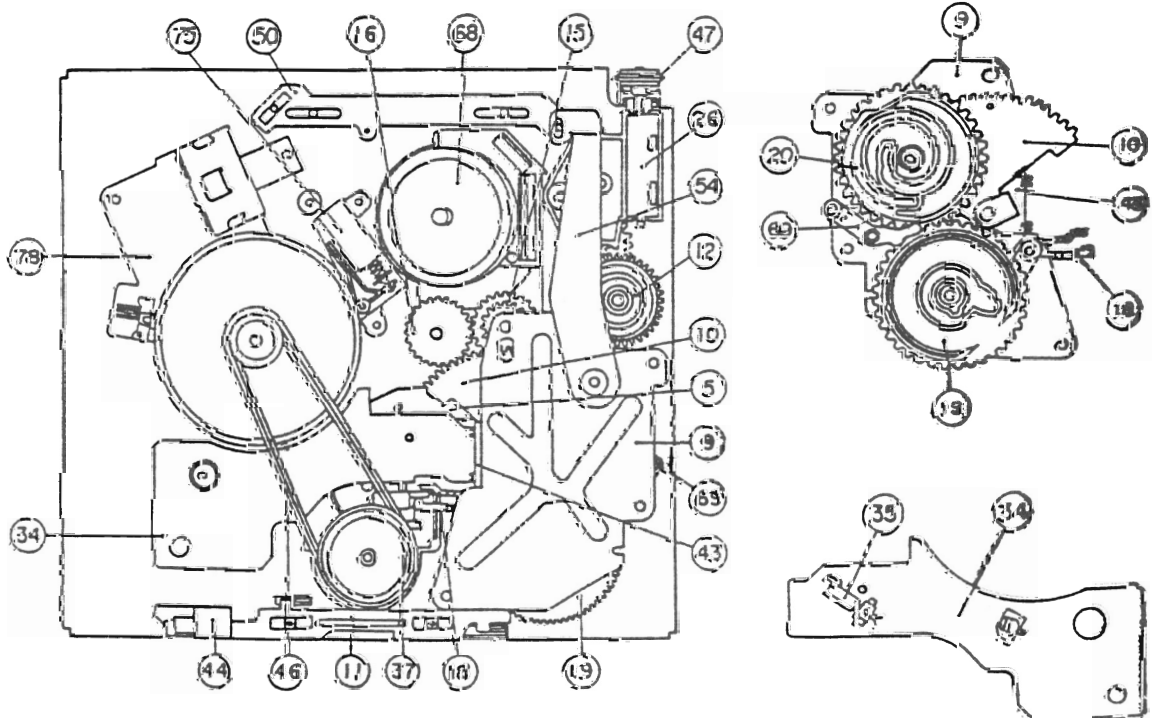
No.	Jig Item	Part No.	Configuration	Remarks
1	Reel Disk Height Adjusting Jig	JIGRH0002		These Jigs are used for checking and adjusting the Reel Disk Height.
2	Master Plane Jig	JIGMP0001		
3	A/C Head Tilt Adjusting Jig	JIGACH51B		This Jig is used for height adjustment of the running tape to the Video Head.
4	Torque Gauge 90g	JiGTG0090		These Jigs are used for checking and adjusting the torque of Take-up and Supply Reel disks.
	Torque Gauge 1.2kg	JiGTG1200		
5	Gauge Head	JIGTH0006		
6	Cassette Torque Gauge	JiGVHT-063		This cassette torque gauge is used for checking and adjusting torque of take-up and supply reel and for measuring tape back tension.
7	Tension Gauge (300g)	JIGSG0300		There are several Gauges used for the tension measurements, 300g and 2.0kg.
	Tension Gauge (2.0kg)	JIGSG2000		
8	Hex Wrench (0.9mm)	JIGHW0009		These Jigs are used for loosening or tightening special Hexagon type screws.
	Hex Wrench (1.2mm)	JIGHW0012		
	Hex Wrench (1.5mm)	JIGHW0015		
9	Alignment Tape (PAL)	VR00CIPSV		This tape is especially used for electrical fine adjustment.
10	Drum Replacing Jig	JiGDT-0001 or JiGDT-0001CD		This is used for the replacement of the VCR's upper drum.
11	Tension Gauge Adaptor	JIGADP003		This Jig is used for the tension gauge, Rotary Transformer Clearance Adjusting Jig.
12	Special Bladed Screwdriver	JIGDRIVER-4		This Screwdriver is used for adjusting the guide roller height.
13	Tension Band and Plate Adjusting Jig	JIGDRIVER-6		This Jig is used for adjusting tension band and tension plate adjustment.
14	Torque Driver	JiGTD1200		This Jig is used for fixing measurement, 12kg.
15	A/C Head Height Adjusting Hex Driver	JIGDRIVER10-7		This Jig is used for height adjustment of the A/C head.

LOCATION OF MECHANICAL PARTS

• TOP VIEW



• BOTTOM VIEW



LOCATION LIST OF MECHANICAL PARTS

No.	Part Name	No.	Part Name
1	Main chassis ass'y	40	Loading motor
2	Guide plate ass'y	41	Audio/control head
3	Tension arm ass'y	42	Full-erase head
4	Shifter (B) ass'y	43	Cam switch
5	Shifter (A) ass'y	44	Brake solenoid
6	Intermediate lever (A)	45	DEW sensor angle
7	Pinch link plate ass'y	46	Reel belt
8	Pinch roller lever	47	Loading belt
9	Reinforcement angle ass'y	48	—
10	Segment gear ass'y	49	Half load lever
11	Brake drive lever	50	Half load shifter ass'y
12	Half loading cam	51	Capstan shaft
13	Audio/control head arm	52	Pole base (A)
14	Auxiliary brake lever	53	Pole base (B)
15	Loading gear (A)	54	Cam lever ass'y
16	Loading gear (B)	55	—
17	LED holder	56	Guide roller (supply side/take-up side)
18	Torque change lever	57	Supply slant pole
19	Brake cam	58	Take-up slant pole
20	Master cam	59	Pinch roller
21	Supply brake lever	60	Supply roller
22	Take-up brake lever	61	X-position adjusting nut
23	Audio/control head arm spring	62	Retaining guide
24	Tension adjusting plate	63	Supply reel disk
25	Tension band ass'y	64	Take-up reel disk
26	Loading block	65	Drum base
27	Loading motor pulley	66	Earth brush
28	Pinch pressure spring	67	Drum
29	Full-erase head arm spring	68	Drum motor
30	Tension arm spring	69	Tension release lever
31	Auxiliary brake spring	70	Reverse guide arm ass'y
32	Main brake spring	71	Universal brake
33	Intermediate lever (B)	72	—
34	Reel sensor PWB	73	Universal brake spring
35	Shifter switch	74	—
36	Reel idler	75	DD brake solenoid
37	Reel pulley	76	—
38	Reel drive unit angle	77	—
39	Connection plate	78	Capstan motor

NOTE:

Current JiGMA0001 contains master plane (JiGMP0001) and Disk Height Adjusting Jig (JiGRH0001). Even though new Disk Height Adjusting Jig (JiGRH0002) covers wider height, this new Jig (JiGRH0002) can be used for current JiGRH0001, however current Jig (JiGRH0001) cannot be used as JiGRH0002. Master plane (JiGMP0001) can be used with JiGRH0001, and also JiGRH0002.

* * * * *

MECHANICAL PARTS REQUIRING PERIODICAL INSPECTION

Use the following table as a guide to maintain the mechanical parts in good operating condition.

Parts	Maintained every	500 hrs.	1000 hrs.	1500 hrs.	2000 hrs.	3000 hrs.	Remarks
Guide roller ass'y		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Abnormal rotation or significant vibration requires replacement.
Supply impedance roller		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Supply impedance roller (inner)			<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	Clean with pure high quality isopropyl alcohol.
Supply impedance roller flange B		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Clean tape contact area with the specified cleaning liquid.
Retaining guide		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Guide flange B		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Slant pole		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Video head		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Clean tape contact area with the specified cleaning liquid.
Full-erase head		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
A/C head		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Capstan belt			<input type="checkbox"/>		<input type="checkbox"/>		Clean rubber and rubber contact area with the specified cleaning liquid.
Pinch roller		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Reel belt			<input type="checkbox"/>		<input type="checkbox"/>		
Loading belt			<input type="checkbox"/>		<input type="checkbox"/>		
Capstan motor						<input type="checkbox"/>	
Loading motor						<input type="checkbox"/>	
Supply/take-up reel disk			<input type="checkbox"/> Δ		<input type="checkbox"/> Δ		Clean with pure high quality isopropyl alcohol.
Tension band ass'y						<input type="checkbox"/>	
Reel drive unit						<input type="checkbox"/>	
Reel idler		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Reel pulley		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Supply/take-up brake lever					<input type="checkbox"/>		

Note: ○ : Part replacement

□ : Cleaning (For cleaning, use a lint-free cloth dampened with pure isopropyl alcohol).

Δ : Oil refilling (The indicated point should be lubricated with high quality spindle oil every 1000 hrs).

This model has no adjusting volumes for torques, tension, etc. If the reading is outside the specified range, clean or replace the part.

REMOVAL ADJUSTMENT AND REPLACEMENT OF CASSETTE HOUSING CONTROL ASSEMBLY

Notes:

1. During removal and installation be careful not to strike the nearby guide pin, drum, etc.
2. Before removal or installation, be sure to unplug the recorder from the AC outlet.

• Removal

1. Put the unit in the cassette ejected position.
2. Disconnect the connector at the right side of the cassette housing control assembly. (Be careful not to break the leads.)
3. Remove the two cassette housing installation screws.
4. Move the cassette housing control assembly (Fig. 1-1) in the direction of arrow \Rightarrow (B), and pull it out straight upward.

• Assembly

1. Connect the connector at the right side of the cassette housing control assembly.
2. Insert the tabs of the cassette housing control assembly into mechanical chassis, move it in the direction of arrow \Rightarrow (A), and secure temporarily. Check to be sure that the cassette housing control assembly is in the correct position, and then tighten the two screws (XHPS330P06WS0).
3. Correctly place the lead wiring of the connector at the right side of the cassette housing control assembly.

(XHPS330P06WS0)

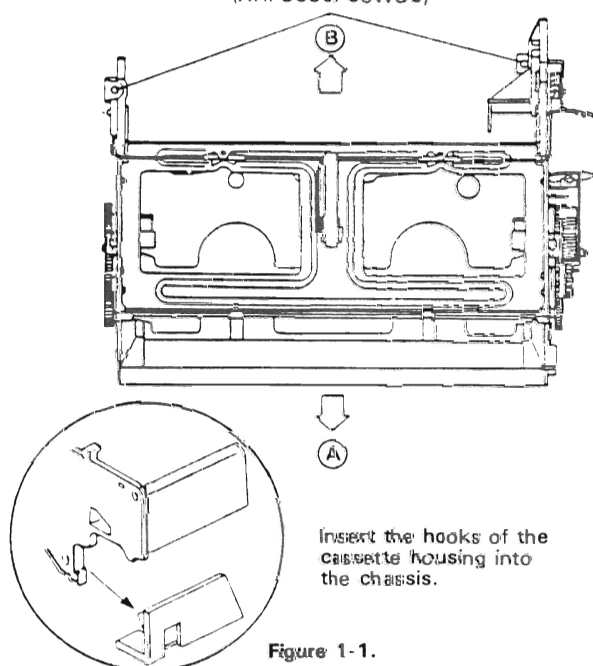


Figure 1-1.

DISASSEMBLY AND REASSEMBLY OF WORM WHEEL ASSEMBLY

• Disassembly (Fig. 1-2)

1. Remove the lead connector (1) from the cassette relay PWB.

2. Loosen the two tabs (A) at the cassette relay PWB and remove the cassette relay PWB from the frame.
3. Remove the screw (2) from the cassette motor bracket and detach the cassette motor assembly together with the cassette relay PWB from the cassette housing frame.
4. Withdraw the worm wheel assembly (3).

• Reassembly (Fig. 1-2)

1. Move the cassette slider assembly towards the cassette lid.
2. Turn the phase gear (5) clockwise until it stops.
3. After setting up the worm wheel assembly, fit the alignment mark (C) of the worm wheel assembly to the alignment mark (B) of the phase gear. Then insert them into the frame shaft: this time, check that the tab (D) of the cassette slider assembly is engaged with the drive arm groove. The worm wheel is likely to fall off the frame shaft in this step: be sure to hold the worm wheel by hand.
4. Align the tab (E) of the timing lever with the worm wheel groove (G) and secure the worm wheel assembly with the screw (2).
5. Align the tab (F) of the timing lever with the groove (H) of the cassette mode switch (6), and secure the cassette relay PWB with the frame's tab (A): this time, check that the two tabs (1) of the cassette mode switch are surely engaged with the cassette motor bracket groove (J).
6. Insert the lead connector into the socket of the cassette relay PWB.

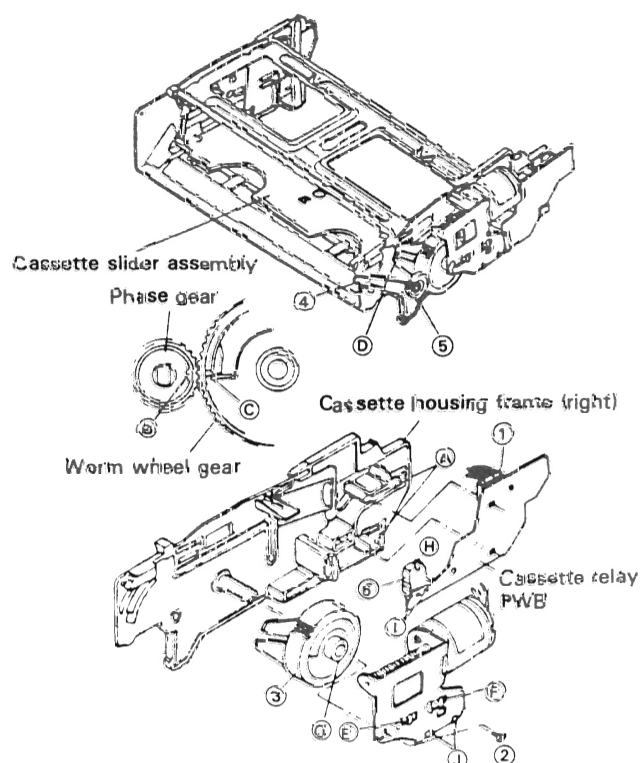


Figure 1-2.

• **Set up of worm wheel assembly (Fig. 1-3)**

1. Put the tab (A) of the drive (1) into the hole (B) of the drive gear (2).
2. Hook both ends of the drive spring (3) onto the tab (A) of the drive arm and tab (C) of the drive gear respectively.
3. hook one end (E) of the drive reciprocating spring (4) onto the tab (D) of the drive gear assembly and mount another end (F) of the drive reciprocating spring onto the tab (G) of the drive gear: this time, hold the end (F) of the drive reciprocating spring by hand.
4. Fit the tab worm wheel gear (5) onto the tag (6) of the drive gear.
5. Using a tapered screwdriver, hook the end (F) of the drive reciprocating spring onto the tab (J) of the worm wheel gear: check that both ends of the drive reciprocating spring have been engaged with the respective tabs of the drive gear assembly.
6. holding the drive gear by hand, turn the worm wheel gear by the other hand counterclockwise. Then tab (C) of the drive gear will be engaged with the hole (I) of the worm wheel gear (5).
(The worm wheel gear doesn't tend to rotate reversely but it is likely to slip out of the shaft (H) of the driver gear. To avoid this, hold both the drive gear and worm wheel gear by hand.)

4. After the above procedures, check that the tab (a) of the cassette slider assembly is engaged with the portion (E) of the drive arm (left) (7).

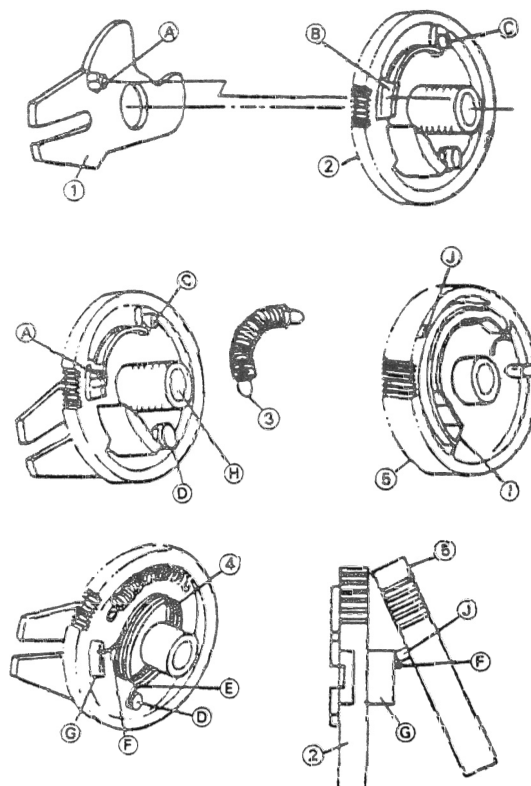


Figure 1-3.

REPLACEMENT OF LOCK RELEASE LEVER

• **Disassembly (Fig. 1-4)**

1. Turn the worm gear (1) by hand counterclockwise until the cassette slider assembly (2) reaches the bottom position.
2. Slightly extend the right and left frames (3) to allow the tabs (A) of the cassette slider assembly (2) to go out of the holes of the right and left frames.
Pushing the tabs (B) of the slider holder (right) (4), pull the slider holder (right) out of the cassette slider (5).
4. Remove the lock release lever (6) from the slider holder (right).

• **Reassembly (Fig. 1-4)**

1. Put the lock release lever (6) to the slider holder (right) (4): check that the tab (C) of the slider holder (right) is surely engaged with the hole (D) of the lock release lever.
2. Move the lock release lever so that it is positioned inside the tab of the cassette slider (5).
3. Extend the right and left frames and let the right and left tabs (A) of the cassette slider assembly be engaged with the grooves of the right and left frames.

For easy insertion, set the drive arm (left) (7) at 5 mm away from its bottom by turning the worm gear clockwise, first.

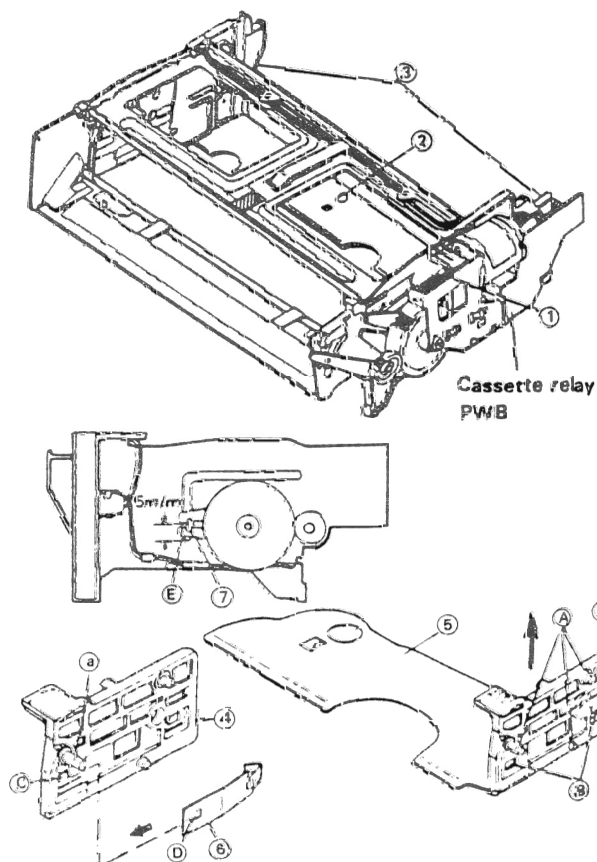


Figure 1-4.

TO RUN A TAPE WITHOUT CASSETTE HOUSING CONTROL ASSEMBLY

1. Open the lid of a cassette tape by hand and hold it open with a piece of vinyl tape.
2. Set the cassette tape in the tape mechanism. Then, stabilize the cassette tape with a weight (500 g or less).

Note: The weight should not be more than 500 g.

REMOVAL AND HEIGHT ADJUSTMENT OF REEL DISKS

• Removal of supply reel disk:

1. Remove tension band ⑥ and tension arm ②.
2. Remove the split washer ①.
3. Pull the supply reel disk ③ upwards, and replace.
- * At this time, remove the height adjusting washer ⑤ and clean it.

• Removal of take-up reel disk:

1. Remove the split washer ①.
2. Pull the take-up reel disk ④ upwards, and replace.
- * At this time, remove the height adjusting washer ⑤ and clean it.

Notes:

1. After replacing either of the reel disks, be sure to perform the height adjustment procedure.
2. Take care as not to damage the tension band.
3. Be careful not to deform the auxiliary brake lever, supply brake lever, take-up brake lever and universal brake lever. (See page 3; item 1.4, 21, 22 and 71.)
4. Check the tension pole position. (See pages 11 and 12.)

• Replacement of supply reel disk:

1. Clean the reel disk shaft, and set the height adjusting washer ⑤.
2. Place the new supply reel disk onto the shaft.
3. Adjust the reel disk height by using the master plane and reel disk height adjusting jig.
4. Take the new supply reel disk off, apply oil (high quality spindle oil) to the reel disk shaft and again place the disk onto the shaft.
5. Replace the split washer ①.
6. Replace the tension arm ② and tension band ⑥.

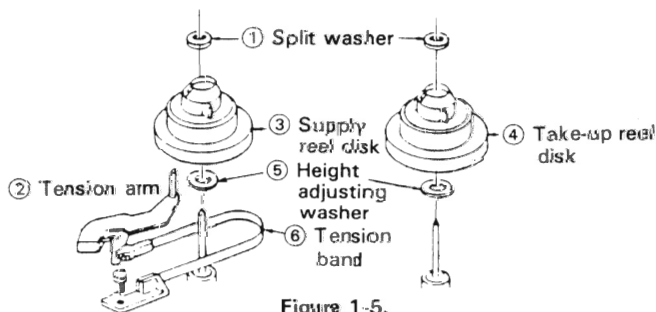


Figure 1-5.

• Replacement of take-up reel disk:

1. Clean the disk shaft, and set the height adjusting washer ⑤.
2. Place the new take-up reel disk onto the shaft.
3. Adjust the reel disk height by using the master plane and reel disk height adjusting jig.
4. Take the new reel disk off, apply oil (high quality spindle oil) to the reel disk shaft and again place the disk onto the shaft.
5. Replace the split washer ①.

Notes:

1. Take care not to damage the reel disk shaft's surface with the tools.
2. After replacement, check back the tension in the video search (VS) mode (see page 11) and checking of brake torque. (See page 13.)

HEIGHT ADJUSTMENT

1. Remove the cassette housing, and place the master plane onto the mechanical unit as shown in Fig. 1-6. (a), taking care not to hit the drum.
2. Insure that the reel disk is lower than part ① but higher than the part ② of Fig. 1-6. (b), by using the reel disk height adjusting jig. If the height is not correct use the height adjusting washers.

Note: Whenever replacing the reel disk, perform the height adjustment.

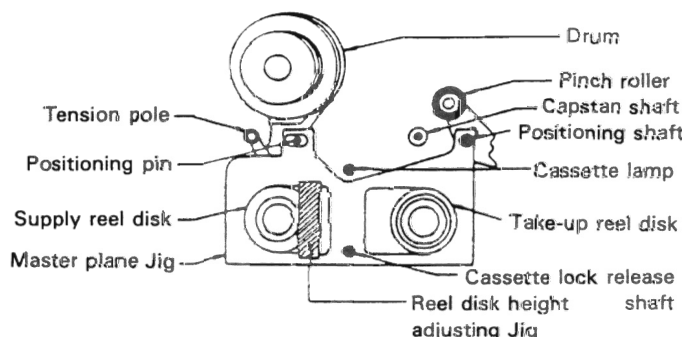


Figure 1-6. (a) top view

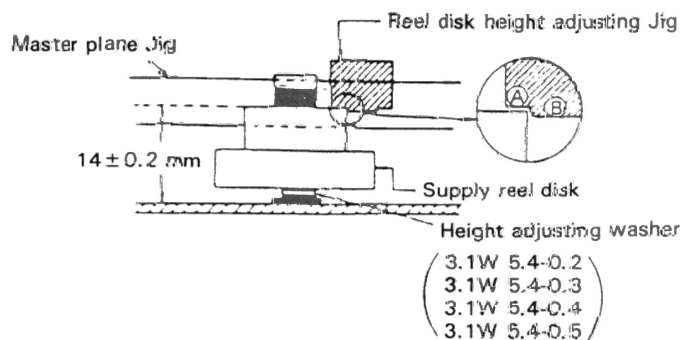


Figure 1-6. (b) side view

ADJUSTMENT OF FAST FORWARD TORQUE

Notes:

1. The torque gauge is liable to slip off the reel disk when rotation starts.
2. Perform this check without the use of a cassette tape.

• Checking (See Fig. 1-7)

1. Remove the cassette housing.
2. Set the torque gauge on the take-up reel disk and push the fast forward button.
3. Turn the torque gauge very slowly by hand (one rotation every 2 to 3 seconds) and check that it indicates a little more than 600 g.cm. Check that there is no slippage between the reel idler and relay idler or take-up reel disk.

• Adjustment

If the fast forward torque is less than 600 g.cm, use isopropyl alcohol to clean the relay idler, reel idler and take-up reel disk, then recheck the torque. If the fast forward torque is still less than 600 g.cm, replace the reel belt.

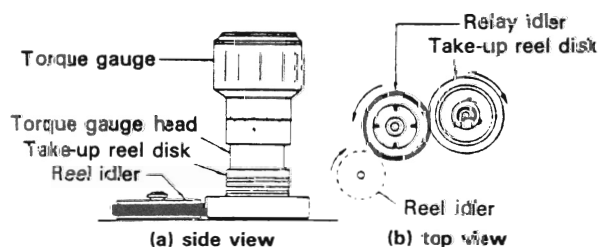


Figure 1-7.

ADJUSTMENT OF REWIND TORQUE

Notes:

1. The torque gauge is liable to slip off the reel disk when rotation starts.
2. Do not check the reel disks, and avoid making this measurement for an extended period.

• Checking (See Fig. 1-8)

1. Remove the cassette housing.
2. Set the torque gauge on the supply reel disk and push the rewind button.
3. Turn the torque gauge very slowly by hand (one rotation every 2 to 3 seconds) until it indicates a little more than 600 g.cm. Check that there is no slippage between the reel idler and relay idler or supply reel disk.

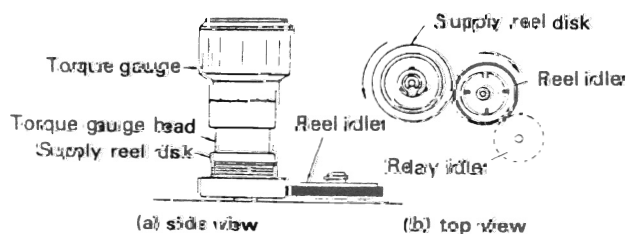


Figure 1-8.

• Adjustment

If the rewind torque is less than 600 g.cm, use isopropyl alcohol to clean the relay idler, reel idler and supply reel disk, then recheck the torque. If the rewind torque is still less than 600 g.cm, replace the reel belt.

ADJUSTMENT OF PLAYBACK TORQUE

• Checking

1. Remove the cassette housing.
2. Place a torque cassette in the mechanism and set the mechanism to the record mode. Check that the torque is within the specified ranges.

Torque in mode: 110 ± 40 g.cm

Note:

The measured torque fluctuates due to the rotational deviation of the reel drive unit. Use the center of the fluctuating range as the measured value.

3. If the torque is outside the specified range, clean the reel idler, take-up reel disk, and relay idler with isopropyl alcohol. Then recheck the torque.
4. Check that the torque in the record mode is within the specified ranges.
5. If the playback torque is still outside the specified range, replace the reel drive unit.

CHECKING THE FAST FORWARD BACK TENSION

Note:

Set the torque gauge securely on the supply reel disk; if the torque gauge is loose above the reel disk an inaccurate measurement will result.

• Checking

1. Remove the cassette housing.
2. Push the fast forward button to place the unit in the fast forward mode.
3. Place the torque gauge on the supply reel disk, turn it clockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within 37 ± 5 g.cm.

CHECKING THE REWIND BACK TENSION

Note:

Set the torque gauge securely on the reel disk; if the torque gauge is loose above the reel disk an inaccurate measurement will result.

• Checking

1. Remove the cassette housing.
2. Push the rewind button to place the unit in the rewind mode.
3. Place the torque gauge on the take-up reel disk, and turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within 20 ± 5 g.cm.

CHECKING THE VIDEO SEARCH BACK TENSION

Note:

Set the torque gauge securely on the take-up reel disk; if the torque gauge is loose above the reel disk an inaccurate measurement will result.

• Checking

1. Remove the cassette housing.
2. Push the play button to place the unit in the play-back mode.
3. Push the video search forward button to place the unit in the video search rewind mode.
4. Place the torque gauge on the take-up reel disk, turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is between 40 ± 8 g.cm.

CHECKING THE PINCH ROLLER PRESSURE

1. Remove the cassette housing.
2. Push the play button to place the unit in the play-back mode.
3. Hook the tension gauge adaptor around the pinch roller shaft.
4. Using a tension gauge, pull the pinch roller in the direction of arrow → (A) so that the pinch roller moves away from the capstan shaft.
5. Gradually release the pressure in the direction of arrow → (B) to allow the pinch roller to touch the capstan shaft. When the pinch roller just touches the capstan shaft, read the indication on the gauge.
6. Check that the reading of the tension gauge is in the range of 1000 to 1200 g.cm.

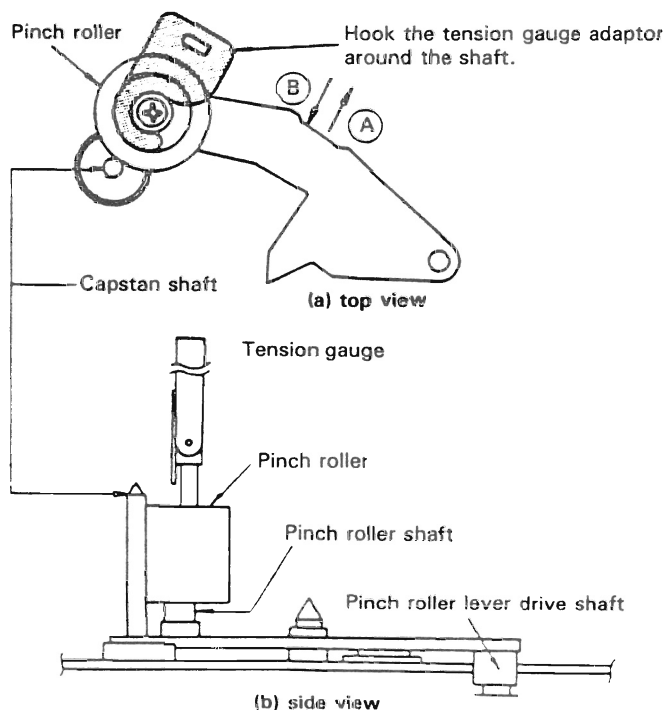


Figure 1-9.

CHECKING THE REEL IDLER PRESSURE

1. Remove the cassette housing.
2. Place the reel idler in its center position as shown in Fig. 1-10.
3. Using a tension gauge, push the reel idler in the direction of arrow → (A), so that the reel idler moves away from the relay idler.
4. Release the pressure gradually in the direction of arrow → (B), so that the reel idler touches the relay idler again. Check that the reading of the tension gauge is within 105 to 145 g.cm.

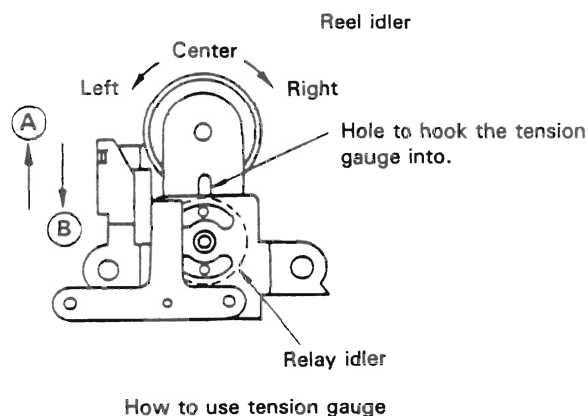


Figure 1-10.

ADJUSTMENT OF TENSION POLE

• Position checking (Fig. 1-11)

1. Remove the cassette housing.
2. Load a video cassette tape and push the record button to place the unit in the recording mode.
3. The pole bases A and B (see page 3; item 52 and 53.) operate to bring the tape outside the cassette housing and simultaneously the tension pole moves to the left, loading the tape. At that time (loading mode), check the position of the tension pole.
4. At the end of the tape (E-180), check that the tension pole's center is 0.6 to 1.0 mm to the right of the supply impedance roller's center.
5. Check that the tape is neither curled against the flange of the supply impedance roller nor mounted over it.
6. During the video search REW mode, check that the supply reel disk is free of the tension band.

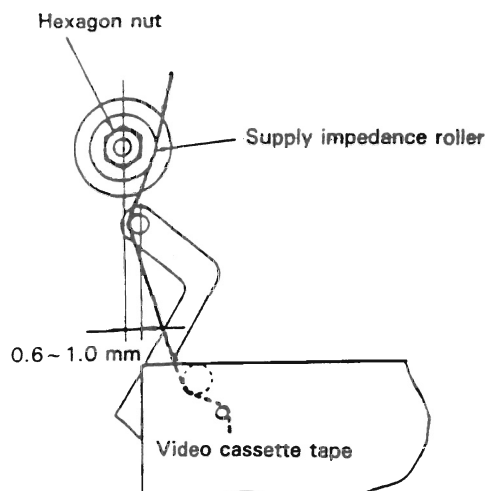


Figure 1-11.

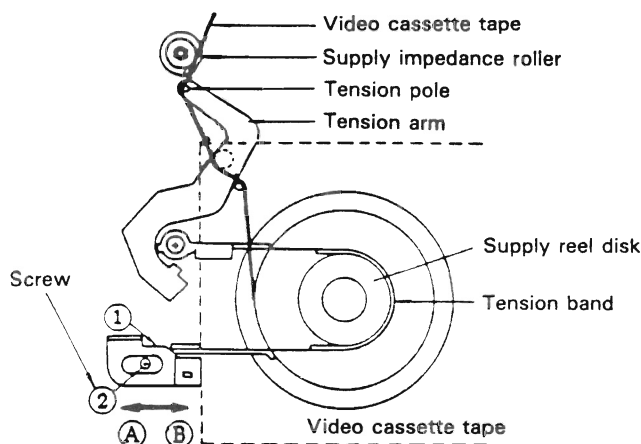


Figure 1-12.

• Position adjustment (Fig. 1-12)

1. If the tension pole is more than 1.0 mm to the right of the supply impedance roller's center, shift the tension band control bracket ① in the direction of arrow → B, and tighten the screw ②.
2. If the tension pole is less than 0.6 mm to the right of the supply impedance roller's center, shift the tension band control bracket ① in the direction of arrow → A, and tighten the screw ②.

Notes:

1. After the adjustment, apply glyptal on the screw.
2. If the screw is tightened beyond its limit (5 kg.cm), its effect becomes nil (be careful not to overtighten.) Use the specified torque driver (JiGTD1200).

ADJUSTMENT OF RECORD/PLAYBACK BACK TENSION

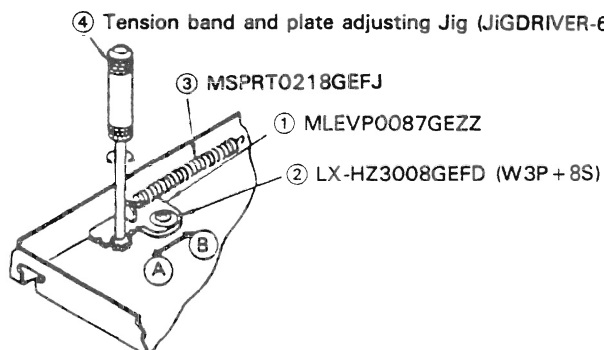
When using a torque meter cassette

• Checking

1. Remove the cassette housing.
2. Put a back tension torque meter cassette tape into the unit.
3. Push the record button to place the unit in the recording mode. Check that the reading of the cassette tape's pointer is 50 to 58 g.cm.
4. Make sure the video cassette tape is wound over the retaining guide.
5. Make sure that the tape is not slack nor damaged at either end.

• Adjustment

1. If the tape tension is less than the specified value move the tension adjust plate by tension band and plate adjusting jig ④ in the direction of arrow → A in Fig. 1-13, and tighten the screw ②.
2. If the tape tension exceeds the specified value move the tension adjust plate by tension band and plate adjusting jig ④ in the direction of arrow → B in Fig. 1-13, and tighten the screw ②.



{ Toward A if lower than specified value
Toward B if higher than specified value

Figure 1-13.

Note:

Be careful not to tighten the screw too much, because this will damage the screw threads of the chassis. Be sure to use the specified Jig (JiGDRIVER-6).

CHECKING THE BRAKE TORQUE

A) Checking the brake torque at the supply side.

• Checking

1. Remove the cassette housing assembly.
2. Check that the mechanism is in the stop mode.
3. Separate the reel idler from the supply reel disk and place the torque gauge on the supply reel disk.
4. Slowly rotate the torque gauge in the clockwise (CW) direction so that the reel disk and the gauge needle rotate at the same speed. Repeat for the counterclockwise (CCW) direction of the supply brake. Check that the values are within the specified ranges (CW direction = 280 to 720 g.cm, CCW direction = 110 to 230 g.cm) and that the brake torque in the CW direction is at least twice as high as the brake torque in the CCW direction at the take-up reel disk.

• Adjustment

1. If the supply brake torque is outside the specified ranges (CW direction = 280 to 720 g.cm, CCW direction = 110 to 230 g.cm), clean the supply reel disk, and then recheck.
2. If the supply brake torque is still outside the specified range, replace the main brake spring, and then recheck.

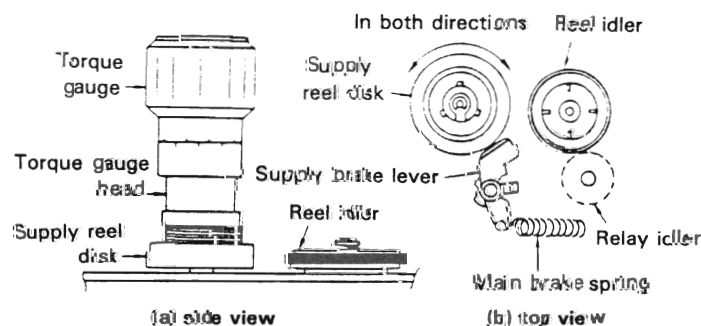


Figure 1-14.

B) Checking the brake torque at the take-up side.

• Checking

1. Remove the cassette housing assembly.
2. Check that the mechanism is in the stop mode.
3. Separate the reel idler from the take-up reel disk and place the torque gauge on the take-up reel disk.
4. Slowly rotate the torque gauge in the CW direction so that the reel disk and the gauge needle rotate at the same speed. Repeat for the CCW direction of the take-up brake. Check that the values are within the specified ranges (CW direction = 280 to 720 g.cm, CCW direction = 110 to 230 g.cm) and that the brake torque in the CW direction is at least twice as high as the brake torque in the CCW direction at the supply reel disk.

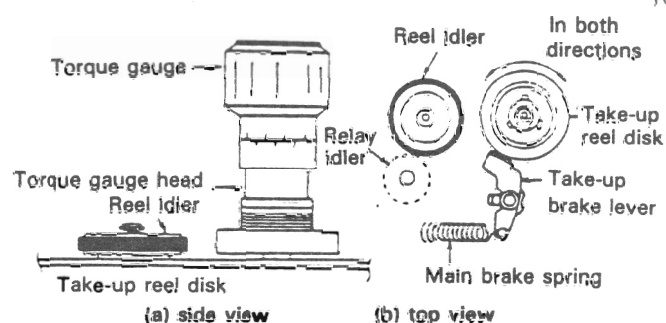


Figure 1-15.

• Adjustment

1. If the take-up brake torque is outside the specified ranges (CW direction = 280 to 720 g.cm, CCW direction = 110 to 230 g.cm), clean the take-up reel disk, and then recheck.
2. If the take-up brake torque is still outside the specified range, replace the main brake spring, and then recheck.

REPLACEMENT OF A/C (Audio Control) HEAD

Note:

After replacement, check for smooth tape movement. Under all circumstances avoid touching the head (indicated by "→" in Fig. 1-17(c)).

• Replacement (See Figs. 1-16 and 1-17)

1. Unsolder the leads attached to the A/C head PWB and remove them from the PWB.
2. Loosen the tilt adjusting screw ② by using a philips screwdriver.
3. Remove the azimuth adjusting screw ⑤ (3P + 8S) with a philips screwdriver.
4. Remove the A/C head screw ④ with a philips screwdriver, paying attention to the spring ⑦ between the A/C head screw ④ and A/C head assembly ①.
5. Remove the connector soldered to the A/C head PWB, and solder the connector onto the new A/C head PWB.
6. The A/C head assembly ① is attached so that the A/C head arm and A/C head plate stand are roughly parallel to one another.
7. Set the A/C head tilt according to Fig. 1-19.
8. Play an alignment tape and roughly adjust the height of the A/C head, by eye, by turning the A/C head adjusting hexagon nut with the special nut driver until the tape comes to the position shown below. (See Fig. 1-16).

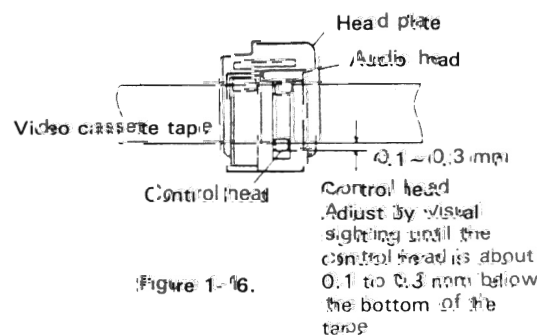


Figure 1-16.

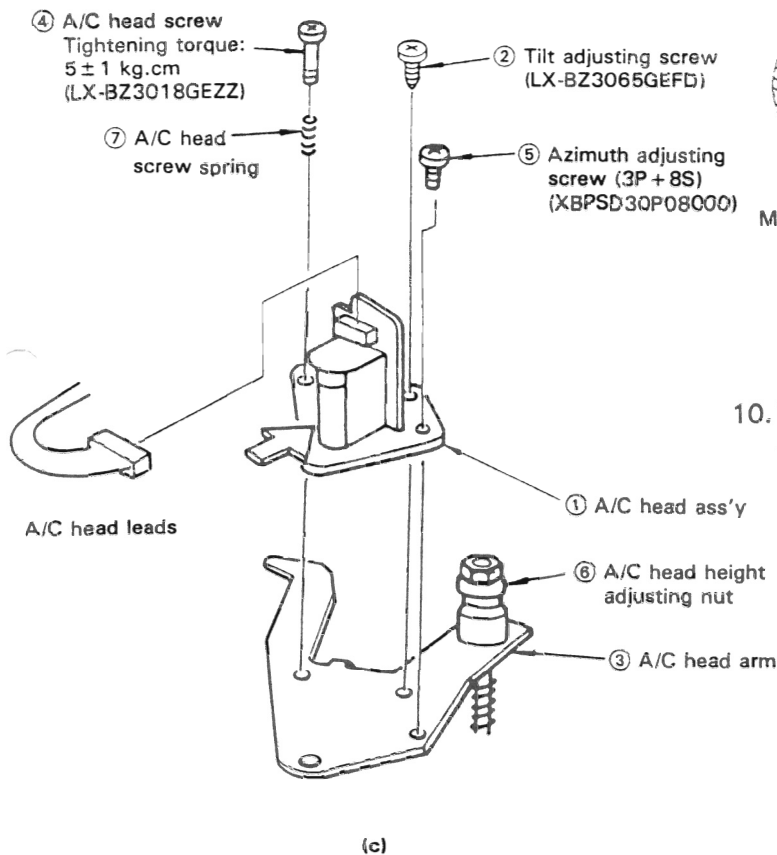
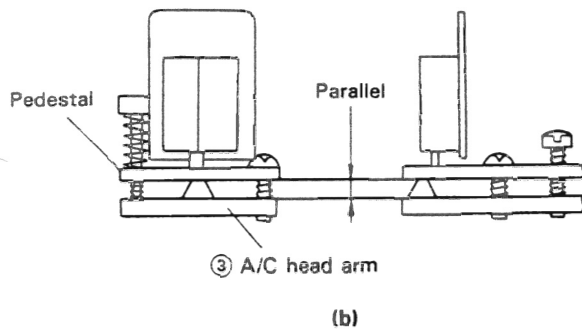
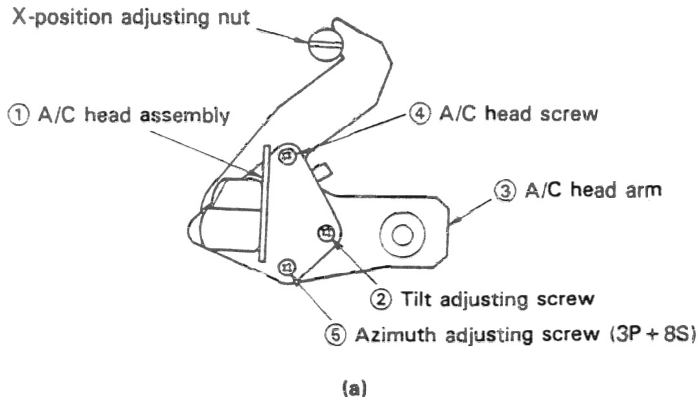


Figure 1-17.

9. Set the mechanism to the unloading mode. Place the A/C head tilt adjusting jig on the main chassis as shown in Figs. 1-18 and 1-19. Slowly turn the set screw with a hex wrench (1.5 mm JiGHW0015) until there is no gap between the jig and the A/C head.

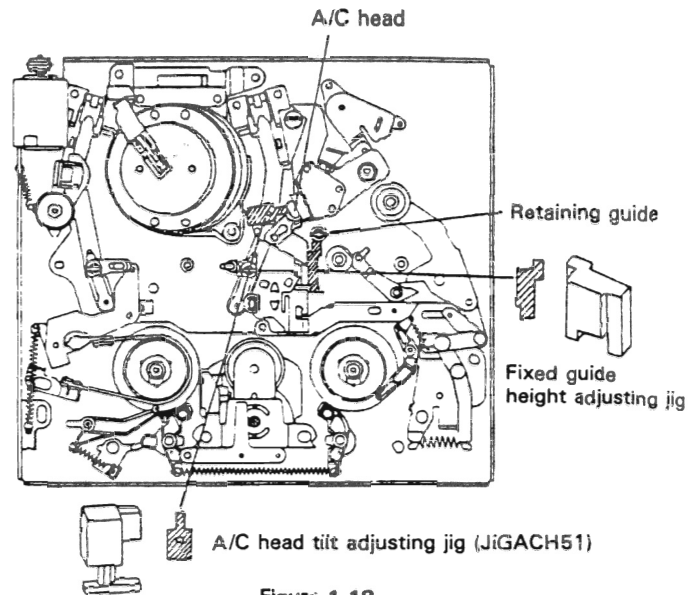


Figure 1-18.

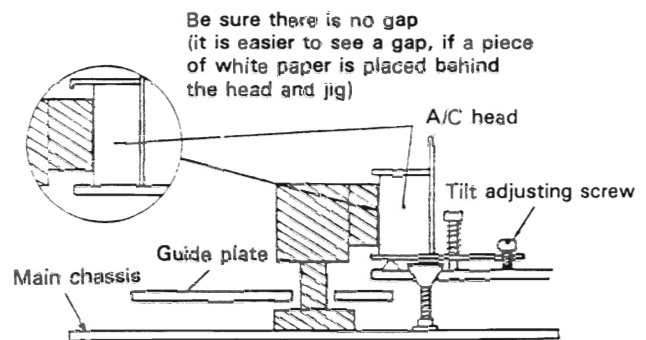


Figure 1-19.

10. When A/C head replacement has been completed, adjust the tape drive train.

ADJUSTMENT OF TAPE TRAVEL

1. Check and adjust the position of the tension pole. And check and adjust back tension.
2. Set the tilt angle of the audio/control head as shown in Fig. 1-19.

Note:

If the audio/control head is adjusted, check and set the tilt angle as in the case of replacement.

3. After completing setting, execute preliminary adjustment of tape travel.
 - a. Connect an oscilloscope to TP2203 (playback chrominance) and TP2201 (ground). Allow the playback chrominance signal to be triggered by the head switching pulse of TP2202.
 - b. Loosen the setscrew of the guide roller, and tighten it loosely by using a guide roller adjusting screwdriver (JiGDRIVERH-4) to such an extent so that the guide roller turns smoothly.

- c. Set an alignment tape (VR0CPSV) on the reel disk.

Note:

When setting the cassette tape on the reel disk without cassette housing, fix the cassette tape with weight of 400 to 650g.

- d. Set playback mode.
- e. Observe the playback chrominance envelope waveform and check flatness of the playback chrominance envelope, turning the tracking control clockwise and counterclockwise. If the playback chrominance output changes almost flat when the tracking control is turned clockwise and counterclockwise, it is good. If the flatness is poor, adjust the guide roller so that the playback chrominance output becomes nearly flat.

Adjust the X-position adjusting nut so that the playback chrominance envelope becomes almost maximum in the tracking center. In the case of rough adjustment, pay particular attention to the outlet side (See Fig. 1-21)

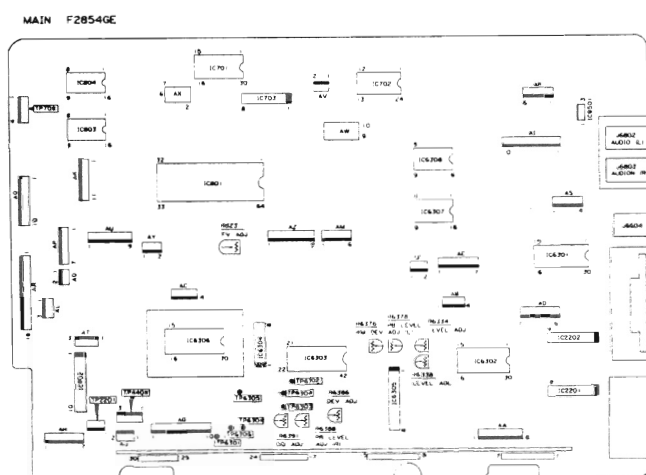


Figure 1-20.

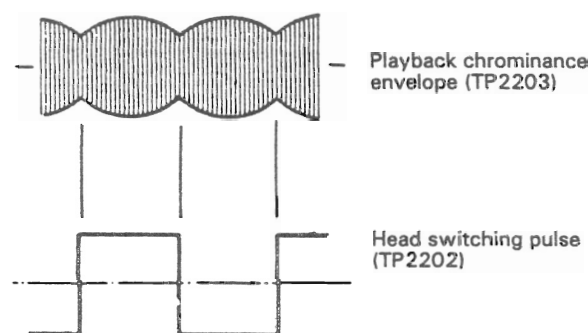


Figure 1-21.

4. When rough adjustment of the tape travel is finished, adjust the audio/control head's height and azimuth.
 - a. Play an alignment of the tape, audio 6 kHz (picture is monoscope), and observe the audio output on an oscilloscope from the audio output terminal.
 - b. Adjust the azimuth adjusting screw ⑤ (3P + 8S) to obtain the maximum audio output level.
 - c. Slowly rotate the audio/control head's height adjusting hexagon nut ③ by the specified box driver (JiGDRIVER 110-7) to obtain the maximum audio output level.
 - d. After the height adjustment, play the alignment tape, audio 6 kHz monoscope, and perform adjustment stated in 4-b. above. After adjustment, apply screwlock to the setscrews and nuts to fix.
5. After the audio/control head adjustment, proceed to final tape travel adjustment and X-position adjustment.
 - a. Connect as stated in 3-a.
 - b. Play an alignment tape (VR0CPSV).
 - c. Observing the envelope on the oscilloscope, finely adjust the guide roller height. Rotate the tracking control clockwise and counterclockwise to adjust the guide roller so as to attain the best flatness of envelope. If the video tape deviates up or down the helical lead, the playback chrominance envelope waveform is as shown in Fig. 1-22. Attain the best flatness of envelope, following the procedure shown in Fig. 1-22.

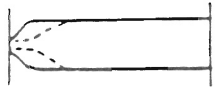
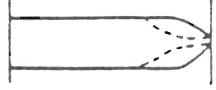






	Tape too high		Tape too low	
	Supply side	Take-up side	Supply side	Take-up side
				
				
Adjustment	Supply side guide roller rotated in clockwise direction (lowers guide roller) to flatten envelope	Take-up side guide roller rotated in clockwise direction (lowers guide roller) to flatten envelope	Supply side guide roller rotated in counterclockwise direction (raises guide roller) to give the tape some play. The supply side guide roller is then rotated in the clockwise direction to flatten the envelope.	Take-up side guide roller rotated in counterclockwise direction (raises guide roller) to give the tape some play. The take-up side guide roller is then rotated in the clockwise direction to flatten the envelope

Figure 1-22.

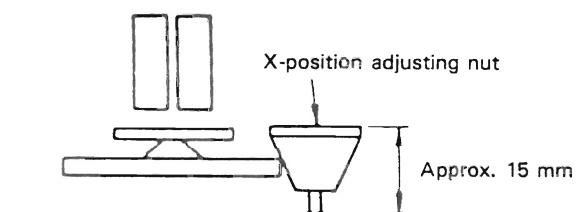


Figure 1-23

REPLACEMENT OF UPPER DRUM

Note:

The engagement between the lower drum (outer diameter) and the upper drum (inner diameter) is very accurate, in the order of microns, and care should be paid to their replacement. Even a slight entry of foreign material will affect the accuracy of their reassembly.

• Replacement (See Fig. 1-24)

1. Unsolder the leads ① to ④ from the video head and remove them.
2. Remove the two screws ⑤ (brass screws with washers (W3P+9S)) using a phillips screwdriver.
3. Withdraw the upper drum by pulling it up with the upper drum replacement jig. (Refer to Fig. 1-24).

Notes:

1. Avoid touching the drum surface with bare hands.
2. Do not hit the screws when tightening them.

• Reassembly

1. Set the new drum for replacement, as shown in Fig. 1-24, and position the leads properly.

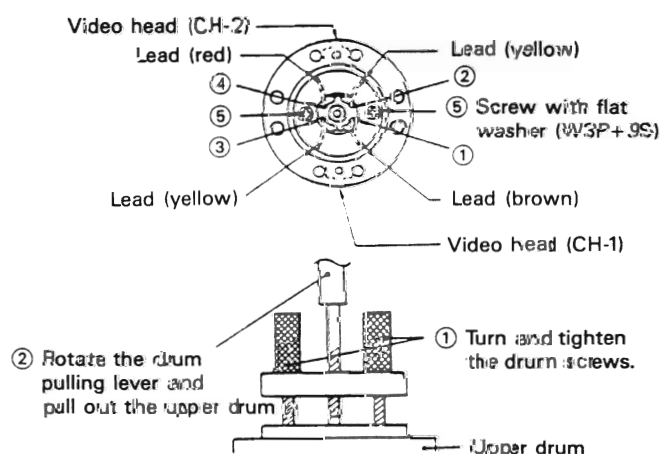


Figure 1-24.

Notes:

1. Before replacing the upper drum, check that there are no scratches or dust on the edge or the outer surface of the lower drum.
2. Before replacing the upper drum, check that there are no scratches or dust on the edge or the inner surface of the upper drum.
3. On assembling these parts, slowly insert the upper drum onto the lower drum with the utmost care, so that the upper drum is not tilted.
4. When assembling these parts, do not allow foreign material to come between them.
5. Do not use excessive force when driving in the screws.
2. Fasten the upper drum in place with the two screws ⑤.
3. Solder the leads from the video head ① to ④ to their respective pads.

Note:

Soldering should be performed quickly and carefully without touching adjacent patterns.

4. After replacement, be sure to check the tape drive train adjustment and the following.
 - Adjustment of the playback switching point (See page 22)
 - Checking and adjustment of the X-position (See page 15)
 - Adjustment of the slow tracking preset (in both the SP and LP modes)

REPLACEMENT OF THE MECHANISM CONTROL ASSEMBLY

• Removal (Fig. 1-25)

1. Unsolder the cam switch terminal.
2. Remove the E-ring ①.
3. Remove the three screws ② (LX-HZ3027GEFD).
4. Remove the mechanism control assembly ③.

• Installation (Fig. 1-25.)

1. Remove the cut poly-slider washer ④.
2. Remove the relay gear (B) ⑤.
3. Adjust the position of the shifter assembly (A) 11 so that the alignment hole ⑥ of the chassis is aligned with the alignment holes of the shifter assembly and brake drive lever 13. (Remove the main brake spring 14 for easier positioning.)
4. Remove the tension arm spring, and fully turn loading gears (A) ⑧ and (B) ⑩ in the direction indicated by the arrow ⑨, to get the mechanism in the unloading mode.
5. Turn the brake cam ⑥ of the mechanism control assembly in the direction indicated by the arrow until the alignment hole ⑥ of the segment gear is at the center of the segment alignment hole for the auxiliary angle.
6. Attach the mechanism control assembly ③ to the main chassis. This can be done easily if the shifter assembly (A) 11 is moved to the left and right. Secure the three screws ②.
7. Put the E-ring ① on.
8. Solder the cam switch terminal.
9. Install the relay gear (B) ⑤.
10. Install the washer ④.
11. Attach any removed springs such as the main brake spring 32. (See page 3)

Notes:

1. Do not exceed the specified torque when tightening the screw or the threads in the boss may become damaged.
2. After replacement, check the position of the parts, and confirm that the unit operates in all modes.



Figure 1-25

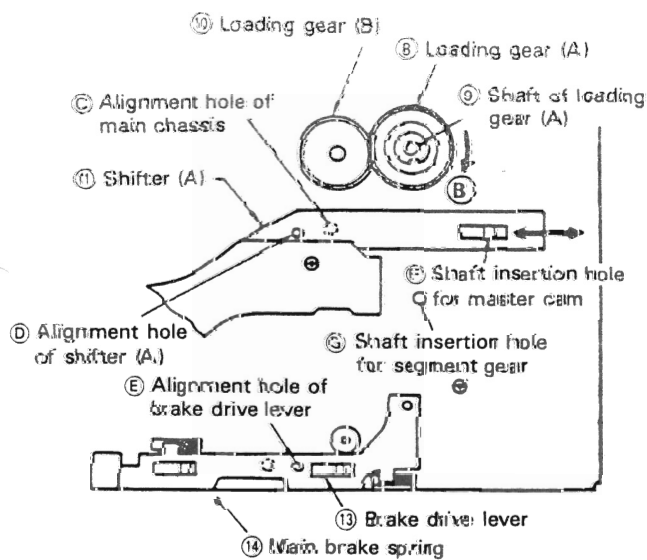


Figure 1-26

REPLACEMENT OF THE CAM SWITCH

• Removal (Fig. 1-27.)

1. Remove the cut poly-slider washer ① and tension release lever ⑧.
2. Detach the brake cam ②, segment gear ⑦ and master cam ⑤ from the mechanism bracket ③.
3. Remove the cam switch ④ while keeping its clips in the arrow directions. (See Fig. 1-2.7 (B).)

• Installation

1. Put the cam switch ④ to the brake cam ②.
2. Install the assembly of the cam switch ④, brake cam ② and tension release lever ⑧ to the mechanism control bracket ③.

Note:

When attaching to the mechanism control unit, make sure that the alignment mark ④ of the master cam is aligned with alignment mark ③ of the brake cam, and line up the torque change lever with the groove on the brake cam.

3. Put the cut poly-slider washer ① on

Notes:

1. After assembly, rotate the brake cam and check that the torque change lever goes into the groove on the cam.
2. When replacing the master cam and brake cam, be sure to apply a light coating of grease to the cam groove.

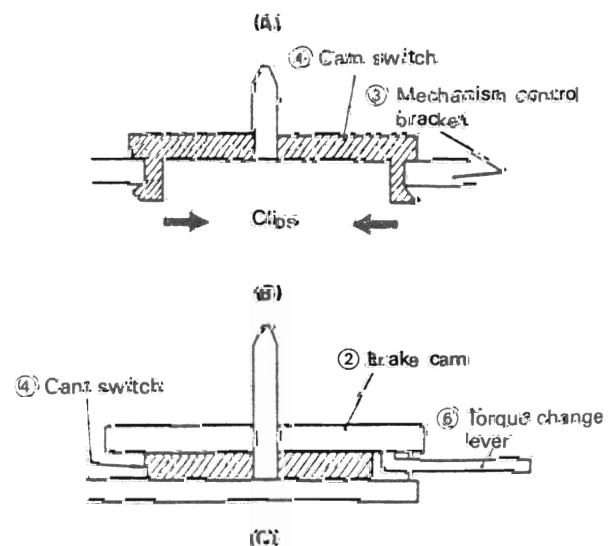
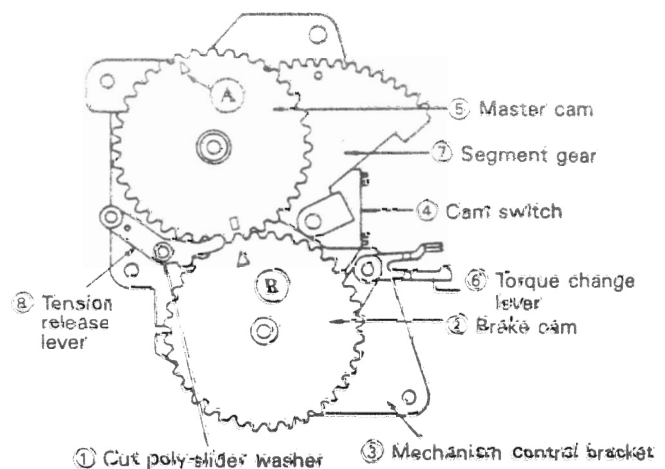


Figure 1-2.7.

REPLACEMENT OF THE CAPSTAN D.D. (DIRECT DRIVE) MOTOR

• Removal

1. Remove the lead wire connector ① (flat type) from the capstan D.D. control PWB ⑥. When removing the connector, push down on the board in order to prevent the board from breaking.
2. Remove the screw ④ which holds the capstan D.D. motor heat sink panel onto the main chassis.
3. Remove the three screws ② 2.6P+5.55 (S-cup) (LX-HZ3036GEFD), and remove the capstan D.D. motor 5 from the main chassis.

• Installation

1. Mount the capstan motor on the main chassis while making sure that the capstan shaft does not come into contact, and attach it with the three screws ②.
2. Attach the capstan D.D. motor heat sink panel on the main chassis with the cup-tight screw ④.
3. Insert the lead wire connector ① (flat type) into the capstan D.D. motor control PWB ⑥.

Notes:

1. After installing the capstan D.D. motor, be sure to rotate the capstan motor and check the movement.
2. Check and adjust the servo circuit.

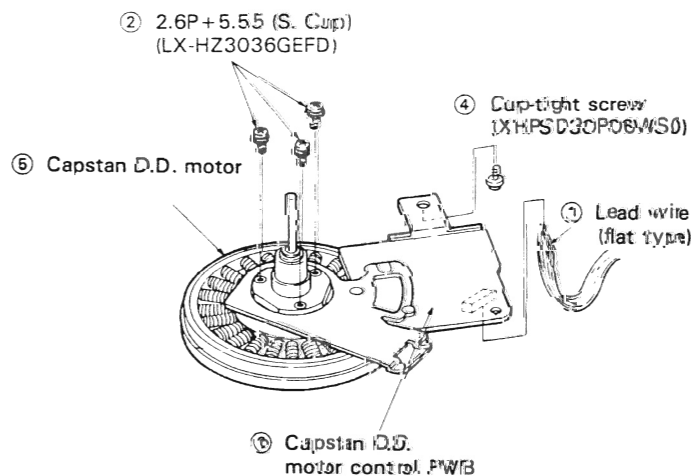


Figure 1-28

CHECKING THE UNIVERSAL BRAKE LEVER

• Checking

1. Remove the cassette housing.
2. Push the playback button to set the unit to the playback mode.
3. Remove the reel idler from the take-up reel disk and set the torque gauge (JIGTG0090).
4. Slowly rotate the torque gauge so that the reel disk and torque gauge pointer turn with the equal speed, and check that the set value is as specified (within 40 ± 10 g.cm).

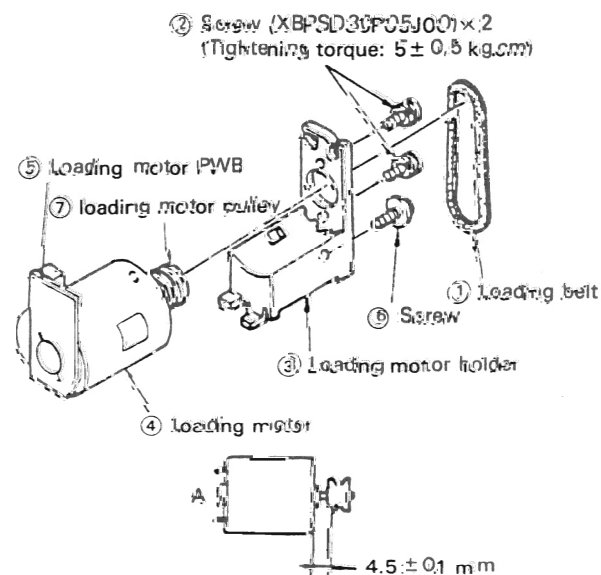
REPLACEMENT OF THE LOADING MOTOR

• Replacement (Fig. 1-29.)

1. Remove the four screws (XEBSD40P1600C) securing the mechanism chassis to the plastic frame.
2. Disconnect the drum D.D. (direct drive) motor lead connector and the loading motor relay lead N connector.
3. Remove the loading belt ①.
4. Remove the cup-tight screw ⑥ (XHPSD30P08WS0). Tilt the mechanism chassis for easy removal.
5. Remove the two screws ② (XBPSD30P05J00) and remove the loading motor ④ from the loading motor holder ③.
6. Remove the loading motor PWB ⑤.
7. Replace the loading motor along with the pulley ⑦.

Notes:

1. Check that the space between the motor and the loading motor pulley is 4.5 ± 0.1 mm.
2. After installing the loading motor, be sure to rotate the loading motor and check for smooth movement.



Hold A (in figure above) and press with a force not exceeding 5 kg.

Figure 1-29.

REPLACEMENT OF D.D. (DIRECT DRIVE) MOTOR

• Removal (Fig. 1-30.)

1. Remove the two screws ① (SW3P+5S) which hold the D.D. rotor assembly in place, using a philips screwdriver.
2. Remove the D.D. rotor assembly by pulling it straight out.
3. Remove the three brass screws ② (2.6P+14S) which hold the D.D. stator assembly in place, using a philips screwdriver.
4. Remove the D.D. stator assembly by pulling it straight out.

• Assembly

1. Place the D.D. stator assembly on top of the lower drum.
2. Secure the D.D. stator with the three brass screws ② (2.6P+14S) using a philips screwdriver.

Note:

Be careful not to scratch the core, windings, or hall device.

3. Insert the D.D. rotor assembly into the drum shaft.

Note:

Insert directly into the direction of the shaft. (Refer to Fig. 1-30 for the installation direction.)

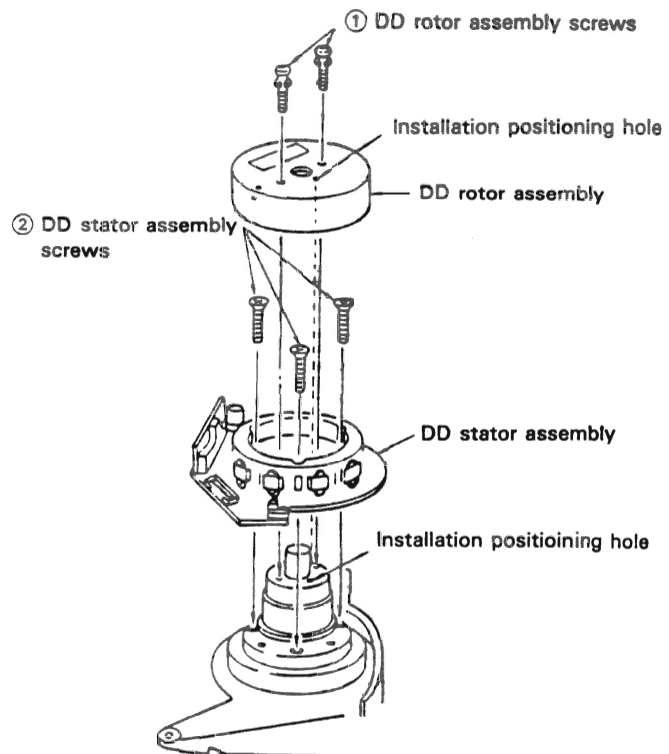
4. Secure the D.D. rotor assembly by the screws ①.
5. Secure the D.D. rotor assembly so that the installation positioning holes in the D.D. rotor assembly and lower drum match.
6. After replacement of the D.D. motor as shown above, proceed with the adjustment of the play-back switching point.

Notes:

1. Be sure not to damage the upper drum or the video head.
2. Be sure that the hall device is not damaged by the D.D. rotor assembly or other parts.

Note:

Check that there is a clearance between the iron core and the DD brake lever when the iron core and solenoid are in close contact.



Note: Secure the DD rotor assembly so that the installation positioning holes in the DD rotor assembly and lower drum match.

Figure 1-30

REPLACEMENT OF DD BRAKE SOLENOID

1. Remove the solenoid wires from the PWB.
2. Remove the two screws ① (XHPSD30P06WS0) fastened to the DD motor base plate.
3. Remove the DD brake lever spring ② (MSPRT0239GEFJ).
4. Remove the slit washer ③ (LX-WZ1006GE00).
5. Lift the DD brake lever ④ (MLEVP0102GEZZ) in the direction A.
6. Remove the two screws ⑦ (XBPSD20P04J00) and two spacers ⑩ (PSPAX0011GEZZ) securing the solenoid ⑤ (RPLU-0077GEZZ) and the DD brake mounting plate.
7. Remove the spring ⑧ (MSPRC0116GEFJ) and slit washer ⑨ (LX-WZ1001GE00) from the iron core.
8. Replace the solenoid.

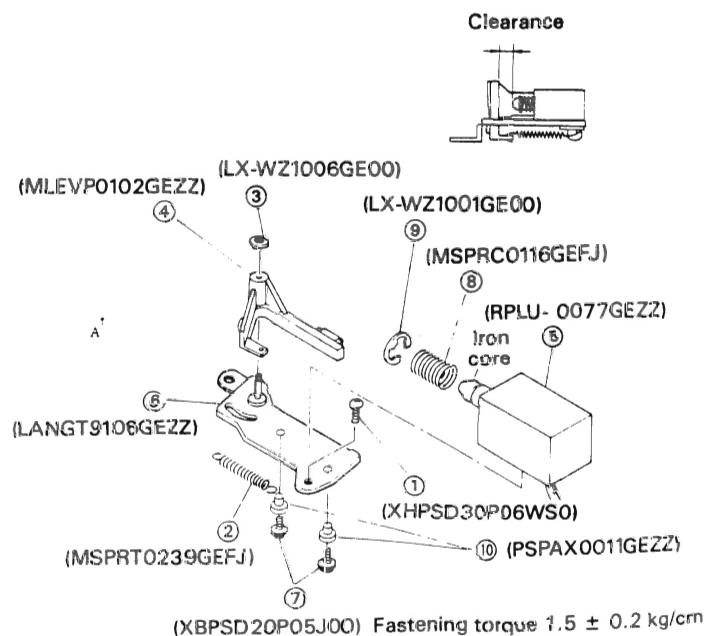


Figure 1-31

HALF LOADING POST POSITIONING

Notes:

1. The half loading post requires repositioning in the following occasions.
 - 1) When the A/C head has been removed or replaced.
 - 2) When the A/C head height, head azimuth or X-position has been readjusted.
 - 3) When the half loading-related parts (half load cam, cam lever, half load shifter, intermediate lever, coupling plate, half load lever and half load lever spring) have been removed or replaced.
 - 4) When the mechanical control unit has been removed or replaced.
2. The half loading post should be checked and repositioned, if necessary, before bringing the machine in the playback mode, in any of the following occasions. Replacement of the A/C head (the A/C head height, head azimuth, and tilt must be finely adjusted, and the X-position adjusting nut height roughly adjusted, in this case), replacement of the half loading-related parts, and replacement of the mechanical control unit.
3. When the A/C head has been replaced, make the X-position adjustment first and then check the half loading post position. Readjust the position as required.

• Procedure:

1. Remove the cassette housing.
Note: This adjustment can also be made without removing the cassette housing. But be sure to disconnect the connector off the right side of the housing.
2. Make sure the machine is in the stop mode.
3. Keep the intermediate lever screw (XBPSD-26P05JSO) tight with a tightening torque of about 1 kg-cm. Now turn the intermediate lever in the direction of arrow A, using the geared driver (JIGDRIVEF-6).
4. Turn the intermediate lever in the direction of arrow B. Apply a torque driver to the half loading post, and tighten up the intermediate lever screw for proper half loading post positioning.
Note: Use the torque driver (JiGTD1200) for this purpose. Set the tightening torque to 5 kg-cm.
5. Set the machine in the eject mode to return the half loading post back. Next set the machine in the stop mode again (to allow the half loading post to come out) to see if the clearance between the half loading post and the A/C head is as specified (0.4-0.7 mm).

6. Actually run the tape to make sure there is no problem with the FF, REW and PB modes.

Note: When the A/C head has been replaced roughly adjust the half loading post position (the above steps 1-5). Then adjust the A/C head's X-position and finely adjust the half loading post position (the above steps 1-6).

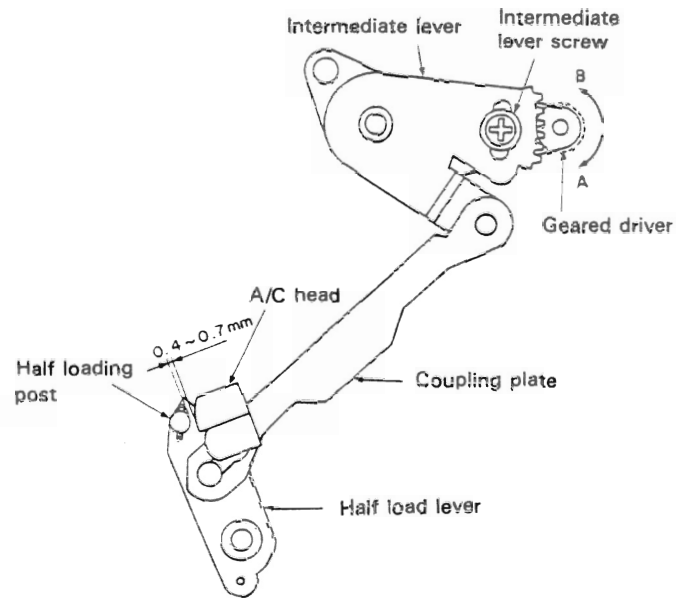


Figure 1-32.

ADJUSTMENT OF ELECTRICAL CIRCUITRY

Prior to the adjustment:

Most of the electrical adjustments are required after mechanical parts (video head included) have been replaced. Check that all the mechanical functions are normal before attempting adjustment of the electrical circuits.

Electrical adjustments require proper troubleshooting. After repair or parts replacement the following alignments may be required.

Note:

In the table below, instruments, test points and instrument readings are listed in this order.

• ADJUSTMENT OF SERVO CIRCUIT

Tracking preset adjustment: R8114

Oscilloscope	CH-1: TP701	Shown in Figure 2-1
--------------	-------------	---------------------

(Internal Trigger: CH-1(+) Side)

1. Insert the alignment tape (VROCPSV) into the unit.
2. Playback the tape and set the playback tracking control at the "center click" position.
3. Adjust R8114 (preset control) to provide the waveform.

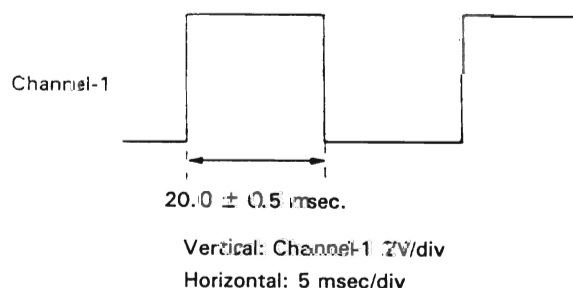


Figure 2-1.

Adjustment of the playback switching point: R8121

Oscilloscope	CH-1: TP703 CH-2: video output terminal	Shown in Figure 2-2
--------------	--	---------------------

1. Insert the alignment tape (VROCPSV) into the unit.
2. Using the pub (-) trigger slope of the oscilloscope, adjust R8121 (SW POINT) to provide a waveform of 6.5 ± 0.5 H as shown in Fig. 2-2.
3. Disconnect the oscilloscope.
4. Remove the alignment tape.

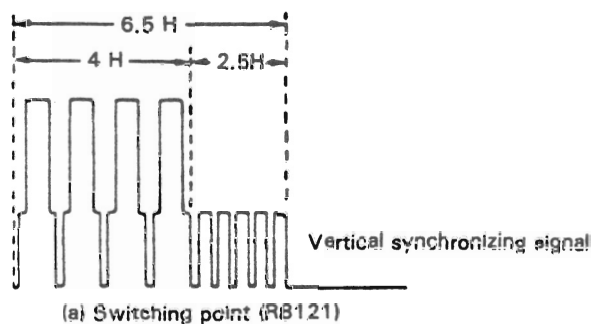


Figure 2-2.

• ADJUSTMENT OF Y/C CIRCUIT

Adjustment of EE level: R253

Note:

Connect a 75 ohm resistor between the video output and ground.

Oscilloscope	Video Output Terminal	Shown in Figure 2-3
--------------	-----------------------	---------------------

(External Trigger: TP2201 on Main PW8.)

1. Put the unit in the record mode.
2. Apply a colour bar signal to the unit.
3. Adjust R253 (EE level control) so that the waveform.
4. Remove the 75 ohm resistor.

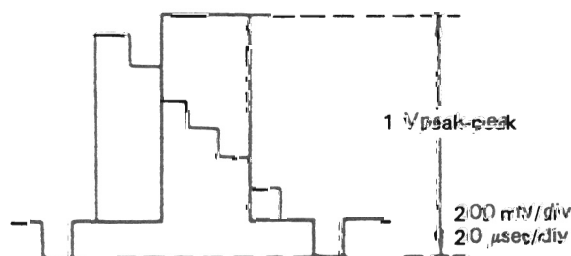


Figure 2-3.

Adjustment of playback video signal level: R209

Note:

Connect a 75 ohm resistor between the video output and ground.

Oscilloscope	Video Output Terminal	Shown in Figure 2-4
--------------	-----------------------	---------------------

(External Trigger: TP2201)

1. Put the unit in the playback mode, an alignment tape (VROCPSV) with a colour bar waveform.
2. Adjust R209 (playback level control) so that the waveform.
3. Remove the 75 ohm resistor.

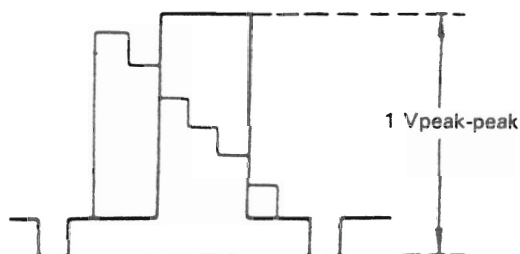


Figure 2-4.

Adjustment of FM 3.8 MHz and 4.8 MHz: R216, R222

1. Turn R229 (white clip control) counter clockwise as far as it will go and release the white clip.
2. Confirm that EE level and PB level are within the specified values.
3. Put the unit in the record mode.
4. Connect a frequency counter to ⑤ Pin of IC201 and adjust R216 (FM carrier) so that the reading becomes 3.8 MHz.
5. Apply a colour bar signal to that unit.
6. Connect the oscilloscope (external trigger: TP2201) to video output (75 Ω terminal).
When the auto record and playback level is less than 1.0Vp-p, turn R222 (deviation) counterclockwise; when it is more than 1.0 Vp-p, turn R222 clockwise. Repeat this until the reading becomes 1.00 ± 0.05 Vp-p. (Refer to Fig. 2-3)
7. Unplug the standard colour bar and input a pin plug and short circuit the input. Connect a frequency counter to ⑤ Pin of IC201 and confirm that the reading is 3.8 MHz.
8. White clip controls are released at step 1, so re-adjustment must be performed.

Adjustment of white clip: R229

Oscilloscope	TP204	Shown in Figure 2-5
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1. Put the unit in the record mode.
2. Apply a colour bar signal (stair-case waveform) to the unit.
3. Adjust R229 (white clip control) so that the resultant waveform.

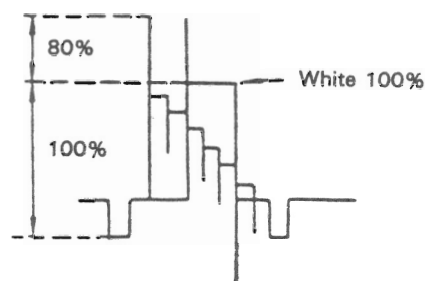


Figure 2-5.

Adjust of FM record circuit: R263, R515

Dual-trace Oscilloscope	GND: TP-32 CH-1 SIG: TP-31 (On the Head Amp PWB)	20 mVp-p (Figure 2-6) 90 mVp-p (Figure 2-7)
-------------------------	--	--

(External Trigger: TP2201/The GND of the external trigger should not be connected to ground.)

1. Put the unit in the record mode.(LP MODE)
2. Apply a colour bar signal to the unit.
3. Connect the GND of the dual-trace oscilloscope to TP-32, CH-1 SIG to TP-31.
4. Set R263 (Record FM level control) to "minimum" position.
5. Adjust R515 (record chroma level control) so that the red signal output is 20 mVp-p. (Fig. 2-6).
6. Adjust R263 (record FM) so that the sync tip is 90 mVp-p. (Fig. 2-7)

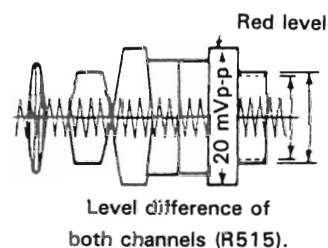


Figure 2-6.

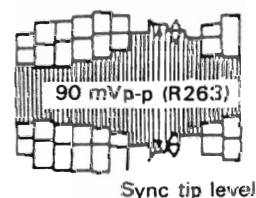


Figure 2-7.

APC Adjustment: R507

Frequency Counter	Y/C PWB Connector 12 pin	4.433619 MHz ± 10 Hz
-------------------	--------------------------	-----------------------------

1. Insert the alignment tape (VROCPSV) into the unit.
2. Adjust R507 so that the frequency 4.433619 MHz ± 10 Hz.

• ADJUSTMENT OF NORMAL AUDIO CIRCUIT

Adjustment of the playback output level: R609
(on Audio PWB)

VTVM	Audio Output RCA Terminals	-9 dBm ± 0.5 dBm
------	----------------------------	-------------------------

1. Playback an alignment tape (VROCPSV) with 1 kHz signal, for level calibration.
2. Adjust R609 (playback level control) to attain an output level.

Erase Voltage/oscillator frequency checking

Oscilloscope Frequency Counter	Both Terminals of Full Erase Head	40 Vp-p 70 kHz ± 7 kHz (Figure 2-8)
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1. Put the unit in the record mode.
2. Make sure the erase voltage is more than 40 Vp-p.
3. Make sure the oscilloscope frequency is 70 kHz ± 7 kHz.

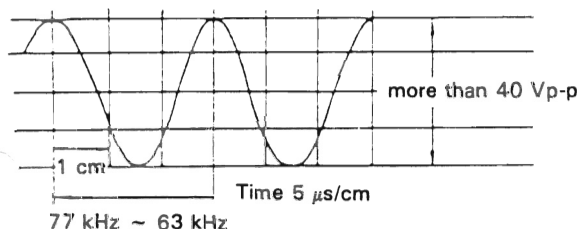


Figure 2-8.

Adjustment of the bias current: R622

VTVM	GND: TP602 SIG: TP601	2.4 mV ± 0.1 mV (240 ± 10 μA)
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1. Put the unit the record mode.
2. Adjust R622 (bias current control) so that the bias current.

Record level checking

VTVM	Audio Output Terminal	-5 dBm ± 3 dBm
------	-----------------------	-----------------------

1. Apply a 1 kHz, -8 dBm to the audio input RCA terminals, record it and then play it back.
2. When playing back, see that the audio output.
3. If not -5 dBm (± 3 dBm), repeat the above adjustments.

• ADJUSTMENT OF SLOW/STILL CIRCUIT**Adjustment of SP slow tracking preset: R8117**

1. Either receive a commercial broadcasting or input the video signal to the video input terminal (the input switch is outside of the unit).
2. Set the recording time switch to the SP mode, record a tape, and play it back.
3. Push the slow speed button to playback the recorded tape at a slow speed.
4. Set the slow tracking control to the center position.
5. Observing the monitor screen, adjust the R8117 (slow tracking preset (SP)) to the position where the noise bars disappear from the screen.
6. Push the play button to put the unit in the playback mode, and then push the pause/still button to reproduce a still picture. At this time, check to see if any noise does not appear on the screen. (Repeat a few times.)

Adjustment of LP slow tracking preset: R8115

1. Either receive a commercial broadcasting or input the video signal to the video input terminal (the input switch is outside of the unit).
2. Set the recording time switch to the LP mode, record a tape, and play it back.
3. Push the slow speed button to playback the recorded tape at a slow speed.
4. Set the slow tracking control to the center position.
5. Observing the monitor screen, adjust R8115 (slow tracking preset (LP)) to the position where the noise bars disappear from the screen.
6. Push the play button to put the unit in the play mode, and then push the pause/still button to reproduce a still picture. At this time, check to see if any noise does not appear on the screen.

Adjustment of still picture vertical synchronization: R823

1. Playback a tape in the SP mode.
2. Push the pause/still button to reproduce a still picture.
3. Observing the monitor screen, adjust R823 (adjustment of SP still picture vertical sync. —adjusted from the bottom of the unit) to the position where vertical jitter disappears from the screen.

• ADJUSTMENT OF ON-SCREEN DISPLAY (O.S.D.) CIRCUIT

The ON-SCREEN DISPLAY system is designed to display at a time and confirm program NO., channel, week/day, starting time and length on the TV monitor screen, though they were displayed and confirmed on the fluorescent tube of timer.

Adjustment of colour burst signal

1. Set to OSD mode.
2. Connect the frequency counter to TP-5902 (signal) and TP-5901 (GND) on the OSD PWB, and adjust the trimmer C5907 (on the IF PWB) to obtain $17.734475 \text{ MHz} \pm 60\text{Hz}$:

Position (lateral) of program characters

After setting to OSD mode, display the content of the program on the monitor screen, and adjust the trimmer C5905 (on the IF PWB) so that the program characters (program NO., channel, month/day, starting time and length stop time) are arranged properly on the screen.

• ADJUSTMENT OF Hi-Fi (HIGH-FIDELITY) AUDIO CIRCUIT

Adjustment of E-E level

1. Apply a signal of -8 dBm, 1 kHz, sine wave to the RCA input terminals.
2. Set the record level control at its center click position.
3. Connect a VTVM to RCA output pin and adjust R8122 (left channel control) and/or R8123 (right channel control) so that the VTVM reads -5 dBm.

Adjustment of reference signal deviation

1. Apply a signal of -8 dBm, 1 kHz, sine wave to the audio input RCA terminals.
2. Adjust the record controls so that the audio output is -5 dBm.
3. Connect a spectrum analyzer to TP6306 (for the right channel) and TP6305 (for the left channel), TP6304 (ground) and adjust R6386 (right channel control) and R6376 (left channel control) so that the deviation is ± 50 kHz.

Note:

This adjustment should be performed after the adjustment of Hi-Fi PB playback tape.

Adjustment of reference signal deviation (using an oscilloscope)

1. Take the same procedures in steps 1 and 2 as in "Adjustment of reference signal deviation."
2. Connect an oscilloscope to TP6306 (for the right channel) and TP6305 (for the left channel). (At the time, set the oscilloscope at 0.2μ sec/div. $10\text{mV}/\text{div.}$)
3. Adjust the peak level of the vertical signal to be at 4th unit of the scale of oscilloscope.
4. Adjust the oscilloscope to obtain the output waveform as shown in Fig. 2-9.
5. Adjust R6386 (right channel control) and R6376 (left channel control) so that the part A of output waveform is as shown in Fig. 2-9.

6. While the unit is in the record and/or playback mode, check that the audio output is within -5 dB ± 1 dB. If this value is not attained, readjust R6376 and R6386.

Note:

This adjustment should be performed after the adjustment of Hi-Fi playback level.

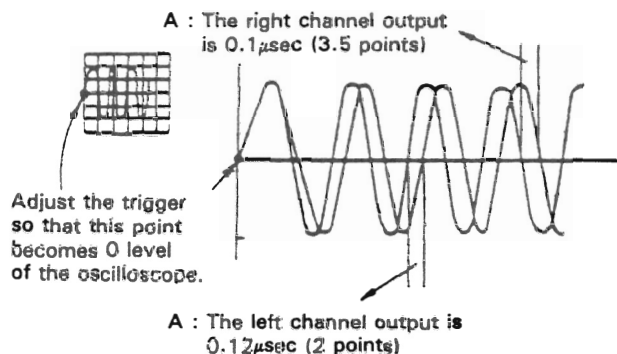


Figure 2-9

Adjustment of drop-out level

1. Set the unit in the playback mode.
2. Adjust R6391 (drop-out level control) so that the voltage of TP6303 is 2.6V (DC).

Adjustment of high-fidelity playback level

1. Play a high-fidelity standard type.
2. Connect a VTVM to the audio output terminal and set the audio output switch at Hi-Fi/Stereo position.
3. Adjust R6388 (right channel playback control) and R6378 (left channel playback control) so that the VTVM reading is within -5 dB ± 1 dB for both channels.

Adjustment of level meter

1. Apply a signal of -8 dBm to the RCA Input Terminals, 1 kHz, sine wave to the audio input terminal.
2. Adjust the record level control so that the output level is -5 dBm for both right and left channels.
3. Adjust R6334 (left channel control) and R6338 (right channel control) so that the level meter indicates 0 dB for both channels.

Adjustment: Digital (A) K2648HE51

Write phase adjustment

1. Set the unit to the EE STROBE mode.

Note:

- Do not use the AUX input or MULTISTROBE mode.
2. Input a colour bar signal.
3. Connect an oscilloscope to TP2801 and adjust C2804 (Write Phase Adj.) for a duty cycle of $50 \pm 10\%$. (Fig. 2-10)

Read phase adjustment

1. Set the unit to the EE STROBE mode.

Note:

- Do not use the AUX input or MULTISTROBE mode.
2. Input a colour bar signal.
3. Connect an oscilloscope to TP2802 and adjust C2810 (Read Phase Adj.) for a duty cycle of $50 \pm 10\%$. (Fig. 2-10)

Picture position adjustment

1. Alternate between the EE and STROBE modes.
2. Input a colour bar signal.
3. While alternating between the EE and STROBE modes, adjust C2804 (Write Phase Adj.) and C2810 (Read Phase Adj.) so that the colour bar stops at the right and left position and shift is eliminated. (Fig. 2-11)

Note:

Adjust the trimmer carefully, as excessive change will impair the memory picture.

Adjustment: Digital (B) K2856HE50

Sub 4.43 MHz adjustment

1. Set the unit to the EE (AUX) mode.
2. Remove the SJ connector.
3. Connect a frequency counter to TP2606 (GND) and TP2605 (Sub 4.43 MHz) and adjust C2609 (Sub 4.43 MHz Adj.) to obtain a frequency counter reading of 4433.62 ± 0.02 kHz at TP2605. (Fig. 2-12)

Master 4.43 MHz adjustment

1. Set the unit to the EE (AUX) mode.
2. Remove the SJ connector.
3. Connect a frequency counter to TP2702 (GND) and TP2701 (Master 4.43 MHz) and adjust C2727 (Master 4.43 MHz Adj.) to obtain a frequency counter reading of 4433.62 ± 0.02 kHz at TP2701. (Fig. 2-13)

Note:

After adjusting both 4.43 MHz, be sure to replace the SJ connector to the previous place.

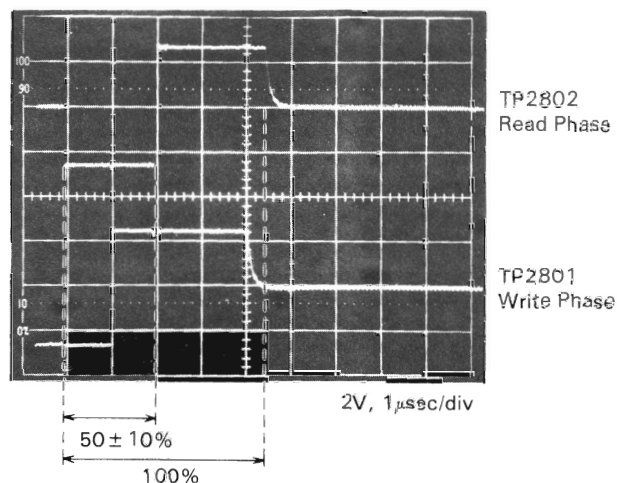


Figure 2-10

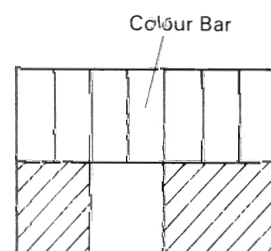


Figure 2-11

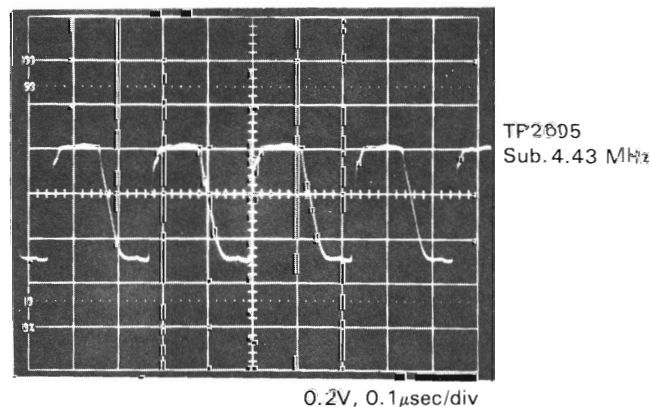


Figure 2-12

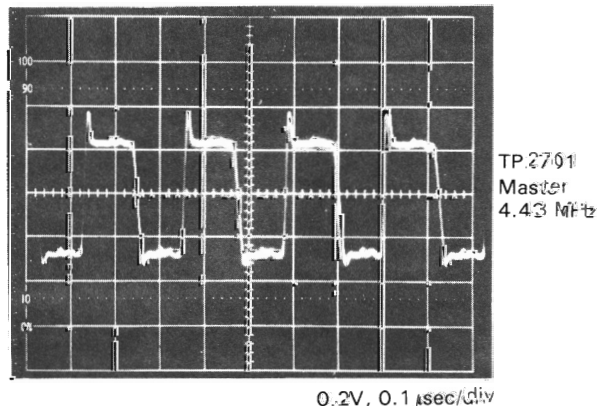


Figure 2-13

Initial set adjustment

1. Set the unit to the AUX mode.
2. Input a colour bar signal.
3. Connect an oscilloscope as follows:
 - Connect CH-2 probe to TP2601 (B-Y)
 - Connect CH-1 probe to TP2602 (R-Y).
 - Connect TP2603 to ground.
 - Connect the trigger (TRG EX) to TP2604 (Write H Blank).
4. Adjust R2606 (Colour Level Adj.) so that the R-Y waveform becomes approximately 1 Vp-p. (Fig. 2-14)

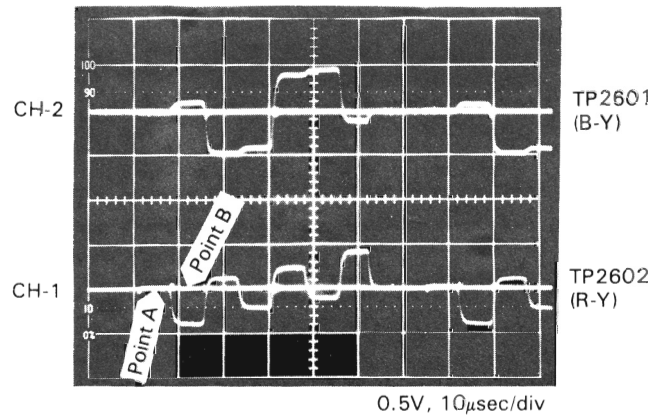


Figure 2-14

Burst phase adjustment

1. Set the unit to the AUX mode.
2. Input a colour bar signal.
3. Connect an oscilloscope as follows:
 - Connect CH-2 probe to TP2601 (B-Y).
 - Connect CH-1 probe to TP2602 (R-Y).
 - Connect TP2603 to ground.
 - Connect the trigger (TRG EX) to TP2604 (Write H Blank).
4. Adjust R2631 (Burst Phase Adj.) with an oscilloscope so that cracking in point A of Fig. 2-14 is minimized.

1H gain adjustment

1. Set the unit to the AUX mode.
2. Input a colour bar signal.
3. Connect an oscilloscope as follows:
 - Connect CH-2 probe to TP2601 (B-Y).
 - Connect CH-1 probe to TP2602 (R-Y).
 - Connect TP2603 to ground.
 - Connect the trigger (TRG EX) to TP2604 (Write H Blank).
4. Adjust R2619 (1H Gain Adj.) with an oscilloscope so that cracking in point B of Fig. 2-14 is minimized.

1H phase adjustment

1. Set the unit to the AUX mode.
2. Input a colour bar signal.
3. Connect an oscilloscope as follows:
 - Connect CH-2 probe to TP2601 (B-Y).
 - Connect CH-1 probe to TP2602 (R-Y).
 - Connect TP2603 to ground.
 - Connect the trigger (TRG EX) to TP2604 (Write H Blank).
4. Adjust L2601 (1H Phase Adj.) with an oscilloscope for minimum overall blur of the R-Y waveform. (Fig. 2-14)

B-Y output precise adjustment

1. Set the unit to the AUX mode.
2. Input a colour bar signal.
3. Connect an oscilloscope as follows:
 - Connect CH-2 probe to TP2601 (B-Y).
 - Connect CH-1 probe to TP2602 (R-Y).
 - Connect TP2603 to ground.
 - Connect the trigger (TRG EX) to TP2604 (Write H Blank).
4. Repeat burst phase adjustment, 1H gain adjustment, and 1H phase adjustment with R2631, R2619, and L2601, until cracking and blur of the waveform are minimized. (Fig. 2-14)

Colour level adjustment

1. Set the unit to the AUX mode.
2. Input a colour bar signal.
3. Connect an oscilloscope as follows:
 - Connect the probe (CH-1 AC) to TP2602 (R-Y).
 - Connect TP2603 to ground.
 - Connect the trigger (TRG EX) to TP2604 (Write H Blank).
4. Adjust R2606 (Colour Level Adj.) so that the R-Y waveform amplitude becomes 1 ± 0.04 Vp-p. (Fig. 2-14)

Carrier balance adjustment

1. Set the unit to the EE (AUX) STROBE mode.
2. Remove the SJ connector.
3. Connect an oscilloscope as follows:
 - Connect TP2702 to ground.
 - Connect a probe to TP2703 (Chroma).
 - Connect the trigger (TRG EX) to TP2704 (C Sync).
4. Adjust R2710 (B-Y Carry BAL.) and R2709 (R-Y Carry BAL) using a alternately to minimize noise at point A in Fig. 2-15.

Note:

After adjusting, be sure to replace the SJ connector to the previous place.

Burst flug level adjustment

1. Set the unit to the STROBE (TUNER) mode.
2. Input a video signal which contains a picture of a human.
3. Switch between the STROBE and EE mode and adjust R2702 (Burst Flug Level Adj.) so that colour depth on the monitor is identical in both modes.

Note:

It is preferable to use the video input of the monitor.

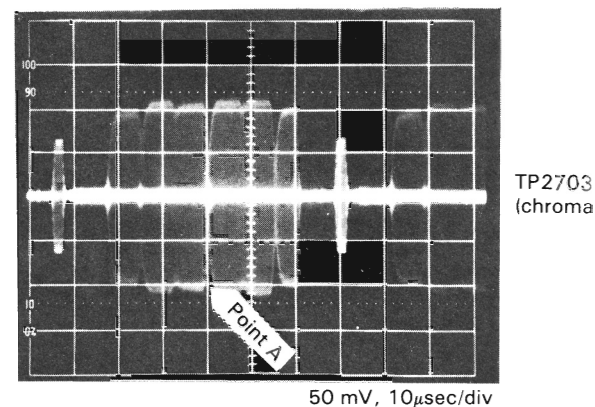


Figure 2-15

Colour phase adjustment of picture in picture

1. Set the unit to the EE (AUX) Picture in Picture mode.
2. Input a video signal which contains a picture of a human.
3. Adjust R2742 (Burst Phase Adj. Pin P) so that the colour phase of main picture and sub picture is identical.

Note:

It is preferable to use the video input of the monitor.

- **H-S Detection Circuit**

PLL frequency adjustment: R1416

1. Connect the frequency counter to the fosc pin of TP1402 after passing through the buffer shown in the figure on the left.
 2. Connect 1μ (50V) between TP1403 and the GND. (Remove the connection after completing adjustment.)
- Adjust R1416 so that the value of the counter display becomes 15.625 kHz.

Within ± 50 Hz

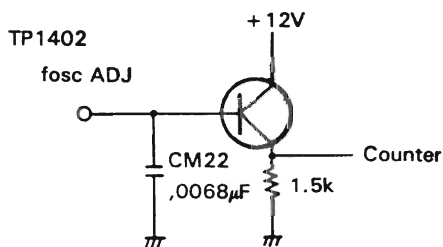


Figure 2-16

Test Point Layout

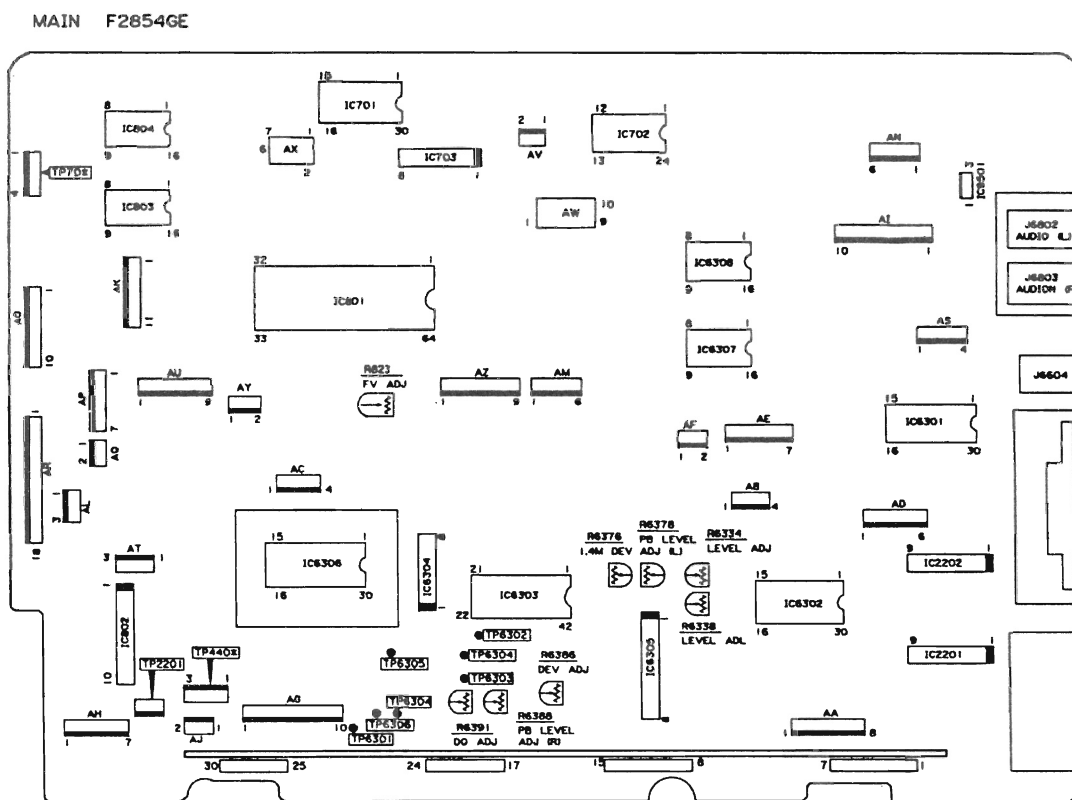


Figure 2-17. Main Circuit

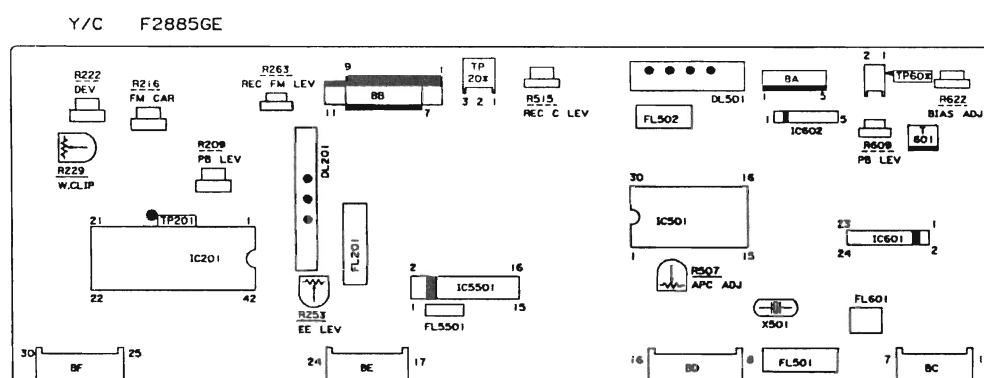


Figure 2-18. Audio, Y/C Circuit

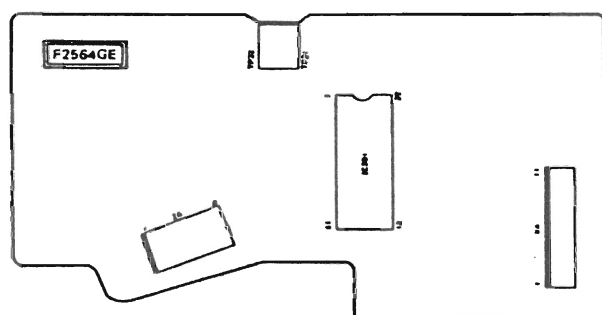


Figure 2-19. Head Amp Circuit

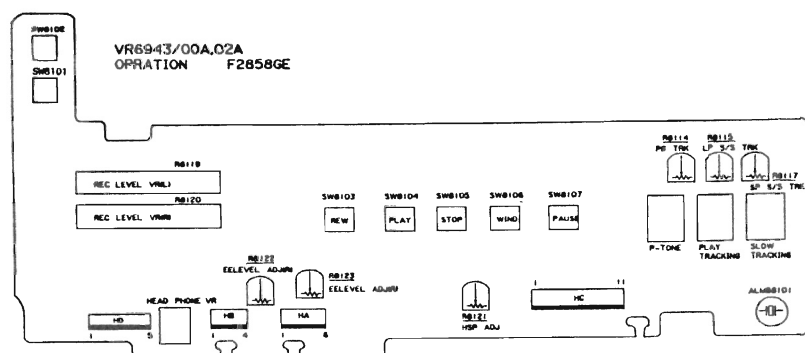


Figure 2-20. Operation Circuit

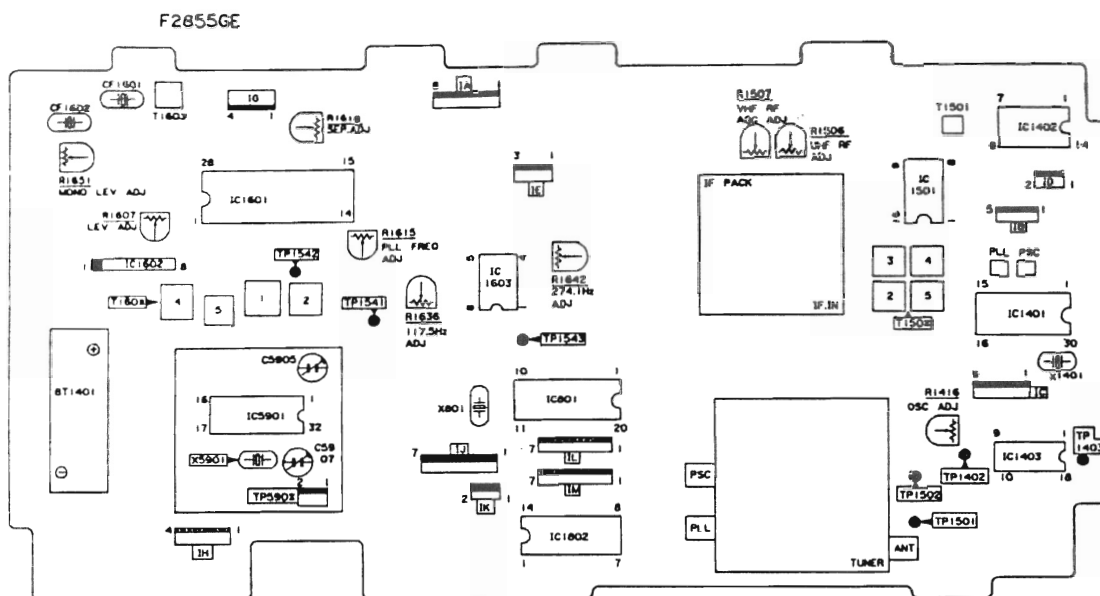


Figure 2-21. IF Circuit

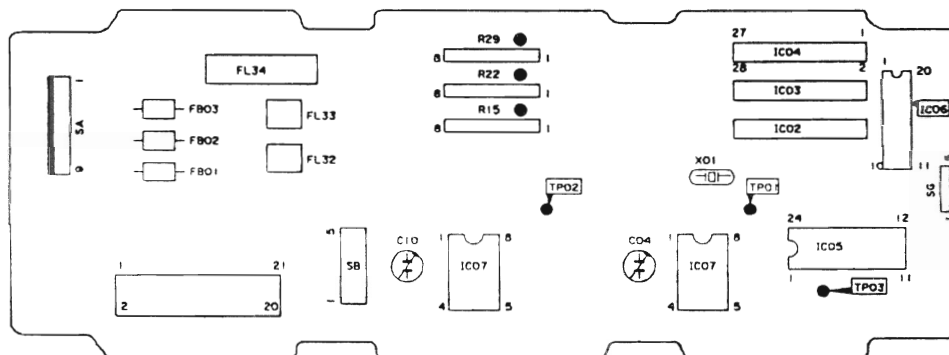
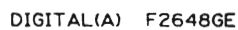


Figure 2-22. Digital (A) Circuit

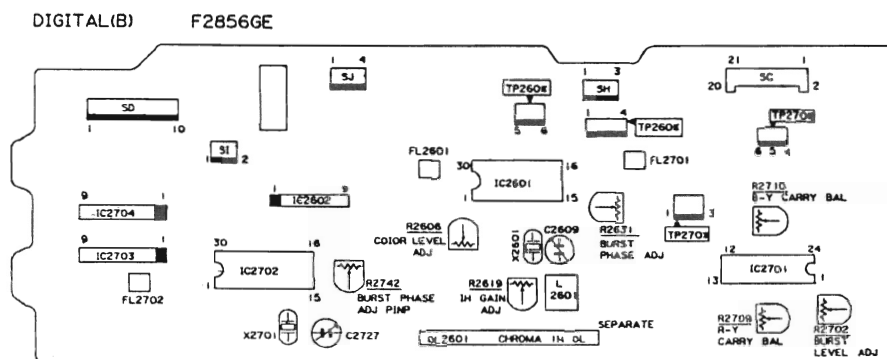
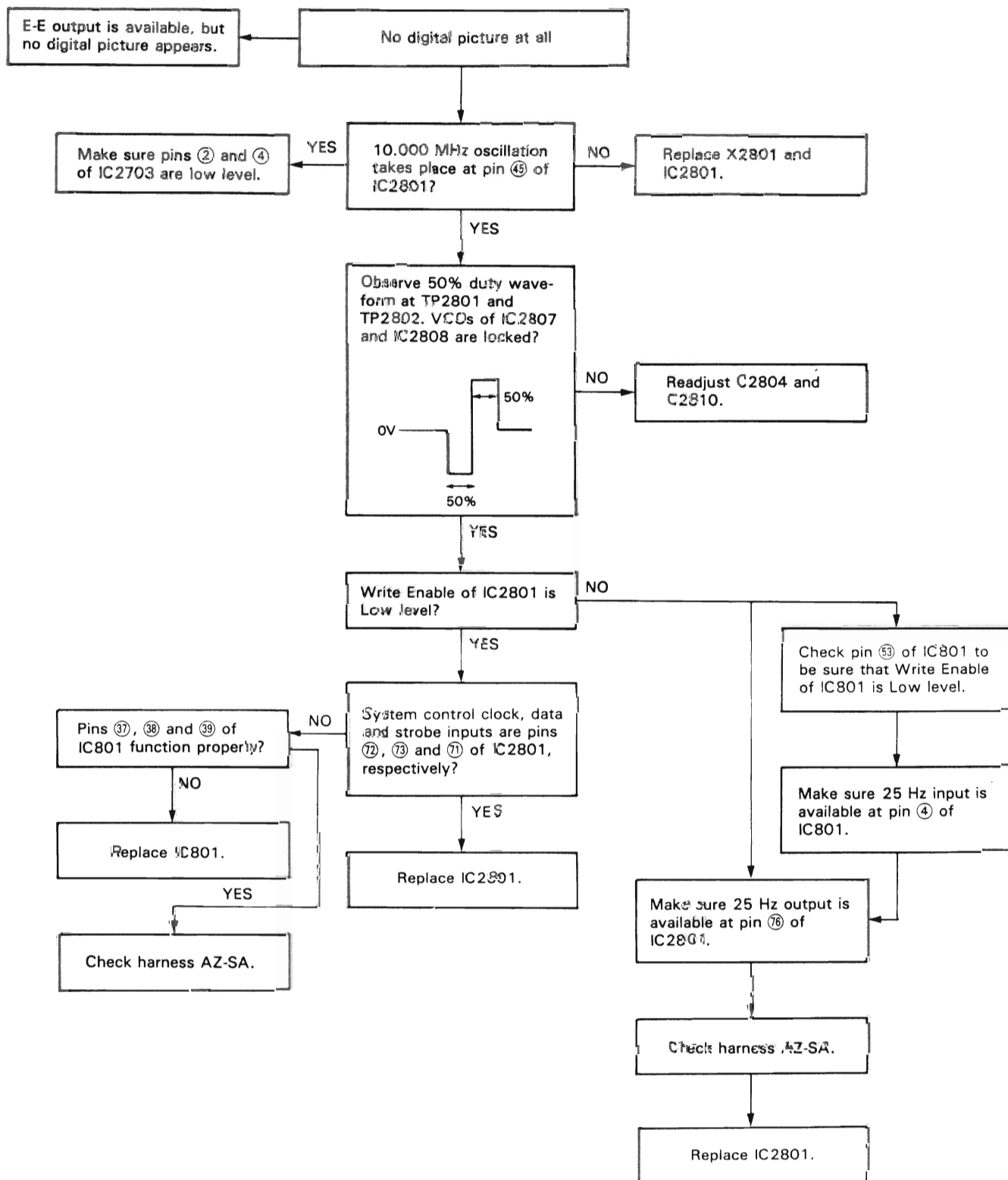
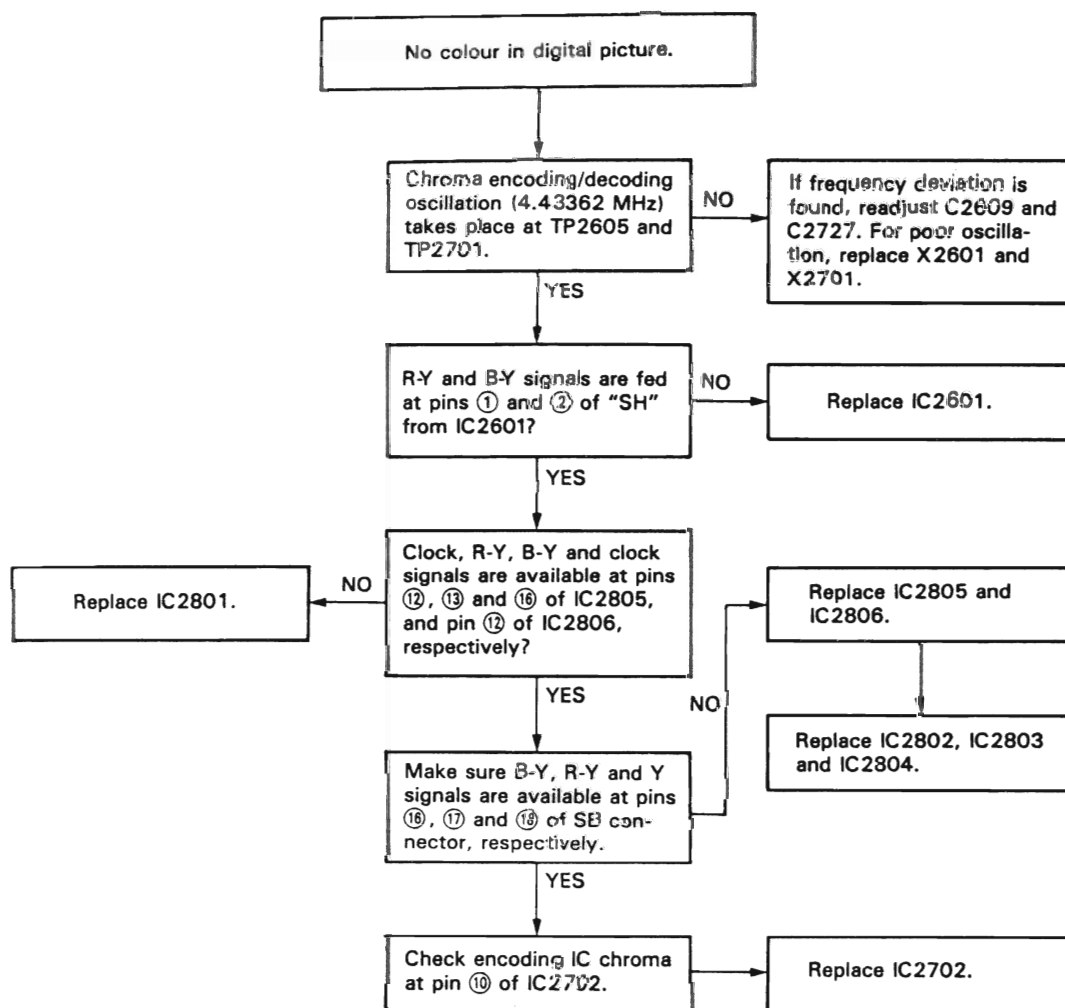


Figure 2-23. Digital (B) Circuit

DIGITAL MEMORY (1) TROUBLESHOOTING



DIGITAL MEMORY (2) TROUBLESHOOTING




TROUBLESHOOTING GUIDE

• TROUBLES OF CONTROL SYSTEM (SERVO, SYSTEM CONTROLLER CIRCUIT)

No.	Problems	Probable causes and countermeasures
1.	No power is supplied.	<ul style="list-style-type: none"> The fuse is blown out; check if there occurs a short-circuit in the internal circuit. Check if there are produced AT5V, UR (unregulated) 15V and AT9V in the power circuit; if not, this means that the power circuit is defective. Check if the system controller (IC801) is normally functioning; check if there are produced reset signals at pin ④⑤ of IC801 and clock signal at pins ④⑥ and ④⑦ of IC801. Check if the power control signal (Low level) goes out of pin ①⑨ of IC801.
2.	No operation is available.	<ul style="list-style-type: none"> Check if the start sensor signal (cassette housing side) and end sensor signal are applied to pins ④① and ④② of IC801 respectively. Check if the unit is in timer mode. Check if the unit is in sensor stop mode. The cam switch is poorly adjusted for its positioning.
3.	After tape loading, the unit is stopped with the tape kept wound over the drum, or the cassette can't be ejected.	<ul style="list-style-type: none"> The cam switch is poorly adjusted for its positioning. IC802 or IC701 is defective.
4.	The unit will stop immediately after it is set in playback or record mode.	<ul style="list-style-type: none"> Check if the head switching pulse is applied to pin ③ (for the drum sensor) of IC801. Check if the drum motor is rotating. Check if the drum pulse generator's signal is applied to pin ⑦ of the servo circuit IC701.
5.	The unit will stop a few seconds after it has been set in playback or record mode.	<ul style="list-style-type: none"> Check if the reel pulse is applied to pin ⑨ (for the reel sensor) of IC801. Check if the capstan motor is rotating. Check if the reel idler is stained or defective.
6.	The tape is not running (the tape is not taken up.)	<ul style="list-style-type: none"> The reel idler is defective. The reel brake is defective. Q807 is defective.
7.	<ul style="list-style-type: none"> The unit stops sometimes during playback or recording. The tape can't be taken up when tape unloading. The tape is scratched when it is wound. Video search is impossible. 	<ul style="list-style-type: none"> Check if there are produced capstan motor control signals at the system controller (servo strobe signal at ③⑦ of IC801, servo clock signal ③⑧ of IC801, servo data signal at ③⑨ of IC801, capstan motor pull up signal at pin ②⑨ of IC801, capstan motor unloading signal at pin ③⑩ of IC801, cassette motor control signal at pin ⑥② of IC801, loading motor control signal at pin ⑥③ of IC801, cassette and loading motors reverse control signal at pin ⑥① of IC801). IC701, IC702 and IC703 are defective.
8.	Fine noises appear at the reproduced picture.	<ul style="list-style-type: none"> The playback phase control is misadjusted (R8121). The tracking preset control is misadjusted (R8114).

No.	Problems	Probable causes and countermeasures
9.	Noises appear intermittently at the reproduced picture.	<ul style="list-style-type: none"> Check for the capstan servo circuit (capstan frequency generator's signal at pin ⑭ of IC702 and playback control signal at pin ① of IC702).
10.	The picture collapses in the horizontal direction.	<ul style="list-style-type: none"> The drum servo circuit is defective. Check if there are drum frequency generator's signal applied to pin ⑥ of IC701 and drum pulse generator's signal to pin ⑦ of IC701. Check if there is reference signal (4.43 MHz) at pin ① of IC701.

• TROUBLES OF SOUND AND REPRODUCED PICTURE (Y/C AND AUDIO CIRCUIT)

No.	Problems		Probable causes and countermeasures
1.	No picture appears.	At E-E mode	<ul style="list-style-type: none"> Check if the video signal (E-E signal) is applied to pin ② of IC201, if the video signal goes out of pin ⑳, and if proper voltage is applied to each pin of IC201.
		At playback of standard tape.	Make sure that there appears a normal picture at E-E mode. <ul style="list-style-type: none"> Check if the playback FM signal is applied to pin ⑩ of IC201. Check if the playback FM signal is applied to pins ⑲ and ⑳ of IC301.
		At playback of the tape recorded by oneself.	Before this checking, make sure that normal playback is possible with standard tape. <ul style="list-style-type: none"> Check if there is FM signal at pin ① of IC201. Check if there is video signal at pin ③⑨ of IC201. Check if there is video signal at pin ②⑨ of IC201.
2.	No colour appears.		<ul style="list-style-type: none"> Check if there is chroma signal at pin ③⑩ of IC501. APC is misadjusted (R507). It is not allowed to re-adjust them, this means that IC501 is defective. Check if IC501 is normally functioning.
3.	The picture collapses when the tape recorded by oneself is played back. <div style="text-align: center; margin-top: 10px;">  </div>		<ul style="list-style-type: none"> Check if there is a normal voltage at each pin of the head amplifier.
4.	Noises appear on the whole of picture when the tape recorded by oneself is played back.		<ul style="list-style-type: none"> Check if there is a normal voltage at each pin of the head amplifier. Clean the video head or replace it a new one.
5.	Noise is noticeable at E-E mode or when the tape recorded by oneself is played back.		<ul style="list-style-type: none"> The tuner and/or RF converter are defective.

No.	Problems	Probable causes and countermeasures
6.	Noises appear on the picture when the tape is played back with standard tape.	<ul style="list-style-type: none"> • Clean the video head or replace it a new one.
7.	There appears no E-E sound.	<ul style="list-style-type: none"> • ALC at IC601 operates improperly. • Check if there is audio signal at pin ⑩ of IC601. • The audio muting circuit is defective.
8.	There appears on sound at playback mode.	<ul style="list-style-type: none"> • The audio head is defective. • Check if playback audio signal is applied to pin ⑦ of IC601 and goes out of pin ⑩.
9.	Sound is distorted.	<ul style="list-style-type: none"> • The audio head is magnetized or defective. • Bias current is insufficient.
10.	There reasonance in the recording or playback is incorrect.	<ul style="list-style-type: none"> • The audio head is magnetized or defective. • Bias oscillator circuit is defective.
11.	Recording is impossible.	<ul style="list-style-type: none"> • Bias oscillator circuit is not normally functioning.
12.	Noise and hum appear frequently during playback or recording.	<ul style="list-style-type: none"> • The audio head is defective.

GLOSSARY

	Abbreviation			Abbreviation	
A	ABSS	Auto Blank Section Scan	J	J.K.F-F	J.K.Flip-Flop
	AFC	Automatic Frequency Control	K	KE	Key Entry
	AFT	Automatic Fine Tuning	L	LED	Light Emitting Diode
	AGC	Automatic Gain Control		LDM	Loading Motor
	ALC	Automatic Level Control		LPF	Low Pass Filter
	APC	Automatic Phase Control		LP	Long Play
	AD	Address	M	MIC	Microphone
	AL	After Loading		MM	Mono-multi Vibrator
	ACL	All Clear	N	NC	Non Connection
	AT	All Time		NS (N/S)	Normal Speed
C	AV (A/V)	Audio/Video	O	OSC	Oscillator
	A-Mute	Audio Mute	P	PAD	Power Assisted Drive
	CAP	Capstan		PAM	Pulse Amplitude Modulation
	CAP.M.	Capstan Motor		PCM	Pulse Code Modulation
	C.FG	Capstan Frequency Generator		PDM (PWM)	Pulse Count Modulation
	C.PG	Capstan Pulse Generator			Pulse Duration Modulation
	CST	Cassette			Pulse Width Modulation
	CST.M.	Cassette Motor			Pulse Frequency Modulation
	CSA	Cassette Switch-A		PFM	Pulse Phase Modulation
	CSB	Cassette Switch-B		PPM	Playback
	CSD	Cassette Switch-D		PB	Phase Generator
D	CH	Channel		PG	Pinch Roller
	CTL	Control		PR	Printed Wiring Board
			R	REC	Record
	D.D.	Direct Drive		REM (R/C)	Remote Control
	D.F.F.	D-Flip-Flop		REV	Reverse
	DM	Drum Motor		REW	Rewind
	D.FG	Drum Frequency Generator	S	RF	Radio Frequency
	D.PG	Drum Pulse Generator		S/H	Sample and Hold
E	D.TPG	Drum Trapezoidal Generator		SN	Signal to Noise
	DET	Detector		SP	Standard Play
	DUB	Dubbing		SS	Start Sensor
				SSVM	Solid State Voltmeter
	EE	Electric to Electric		STILL-H	Still Mode High Level
	EF	Emitter Follower		SUP-REEL	Supply Reel
	EP	Extended Play	T	SW	Switch/Switching
	ES	End Sensor		TPG	Trapezoidal Generator
F	F-ADV-P	Frame Advance Pulse	U	TU-REEL	Take-up Reel
	FWD	Forward		UL	Unloading
	F/R	Forward/Reverse	V	UR	Un regulated
	FF	Fast Forward		VCO	Voltage Controlled Oscillator
	FM	Frequency Modulation		VCR	Voltage Controlled Resistor
	F.G.	Frequency Generator		V-MUTE	Video Mute
	F.E.	Full Erase		V-LOCK	Vertical Lock for False Vertical
	FV	False Vertical Sync.		VS (PS)	Sync Signal
H	HIFI	High Fidelity			Video Search (Picture Scan)
	HPA	High Pass Amplifier			Video Search Forward
	HPF	High Pass Filter			Video Search Reverse
	HS (H/S)	Half Speed			Vacuum Tube Voltmeter
I	HSP	Head Switching Pulse		VSF	
	H. SYNC	Horizontal Sync.		VSR	
	ID	Identical Amplifier		VTVM	
	IF	Intermediate Frequency			

SCHEMATIC DIAGRAM

IMPORTANT SAFETY NOTICE:

BE SURE TO USE GENUINE PARTS FOR SECURING THE SAFETY AND RELIABILITY OF THE SET.

PARTS MARKED WITH "Δ" AND PARTS SHADED (IN BLACK) ARE ESPECIALLY IMPORTANT FOR MAINTAINING THE SAFETY AND PROTECTING ABILITY OF THE SET.

BE SURE TO REPLACE THEM WITH PARTS OF SPECIFIED PART NUMBER.

SAFETY NOTES:

1. **DISCONNECT THE AC PLUG FROM THE AC OUTLET BEFORE REPLACING PARTS.**
2. **SEMICONDUCTOR HEAT SINKS SHOULD BE REGARDED AS POTENTIAL SHOCK HAZARDS WHEN THE CHASSIS IS OPERATING.**

NOTES:

1. The unit of resistance "ohm" is omitted ($k = 1000$ ohm, $M = 1$ Meg ohm).
2. All resistors are $1/8$ watt, unless otherwise noted.
3. The unit of capacitance "F" is omitted ($\mu = \mu F$, $p = pF$).

VOLTAGE MEASUREMENT CONDITIONS:

1. DC voltages are measured between points indicated and chassis ground by VTVM, with AC220V/50Hz supplied to unit and all controls are set to normal viewing picture unless otherwise noted.
2. Voltages are measured with $10000\mu V$ B & W or colour signal.

WAVEFORM MEASUREMENT CONDITIONS:

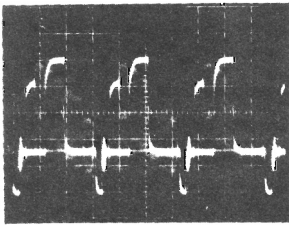
$1000\mu V$ 87.5 percent modulated colour bar signal is fed into tuner:

CAUTION:

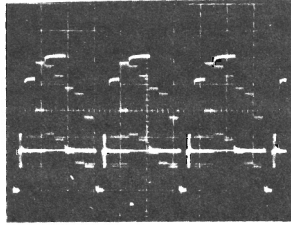
This circuit diagram is original one. Therefore there may be a slight difference from yours.

WAVE FORMS

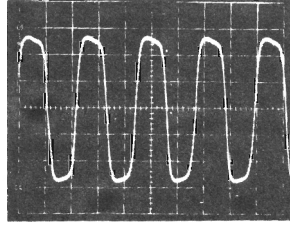
SYSTEM CONTROL, SERVO, IF PWBs



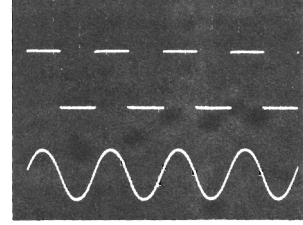
Video output terminal
(Video output is shorted with
a 75 ohm resistor.)
Video signal
200mV/Division
20 μ sec/Division
—Playback mode—



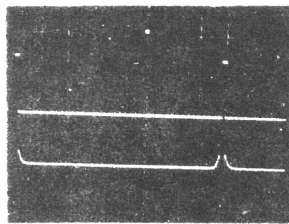
Video output terminal (E-E level)
(Video output is shorted with
a 75 ohm resistor.)
Video signal
200mV/Division
20 μ sec/Division
—Record mode—



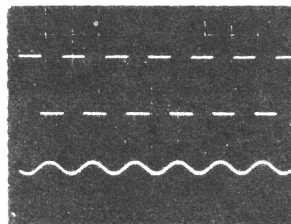
Y/C Module 3 pin
4.43 MHz oscillation signal
200mV/Division
0.1 μ sec/Division



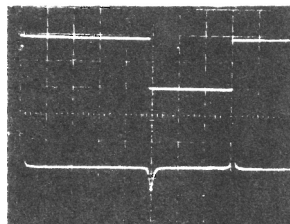
IC702 16 pin
Capstan frequency generator pulse
(output)
2V/Division
0.5msec/Division
Connector AW 3 pin
Capstan frequency generator signal
(input)
1V/Division
0.5msec/Division
—Record mode—



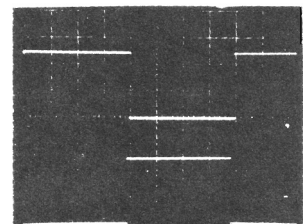
IC702 18 pin
Drum phase generator pulse
(output)
2V/Division
5msec/Division
Connector AN 1 pin
Drum phase generator pulse
(input)
200mV/Division
5msec/Division
—Record mode—



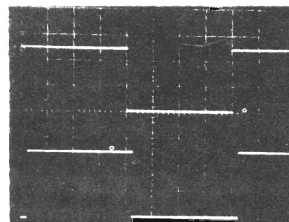
IC702 18 pin
Drum frequency generator pulse
(output)
2V/Division
1msec/Division
Connector AN 3 pin
Drum frequency generator signal
(input)
50mV/Division
1msec/Division
—Record mode—



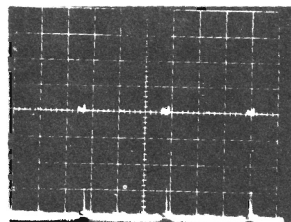
TP702
Playback control pulse
2V/Division
5msec/Division
IC702 3 pin
Playback control pulse
500mV/Division
5msec/Division
—Playback mode—



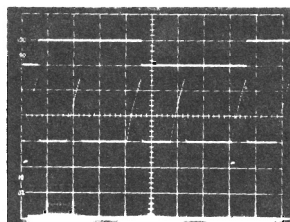
TP703
Head switching pulse
2V/Division
5msec/Division
TP701
Tracking MM pulse
2V/Division
5msec/Division
—Playback mode—



TP703
Head switching pulse
2V/Division
5msec/Division

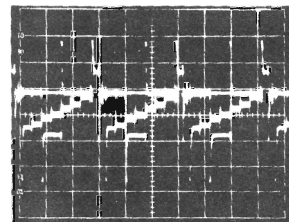


TP2201
Horizontal sync pulse
1V/Division
20 μ sec/Division
—Record mode—

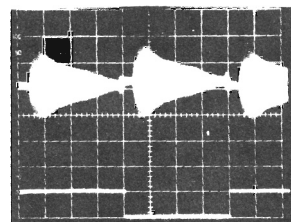


IC701 9 pin
Head switching pulse
5V/Division
5msec/Division
IC701 8 pin
Drum pulse generator MM
2V/Division
5msec/Division
IC701 7 pin
Drum pulse generator (input)
2V/Division
5msec/Division

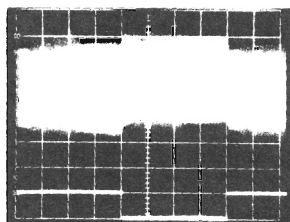
Y/C, AUDIO PWB



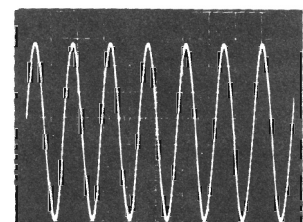
TP204
White/Dark clip signal
200mV/Division
20 μ sec/Division
—Record mode—



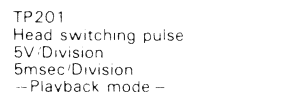
TP203
Playback preamp. signal
100mV/Division
5msec/Division



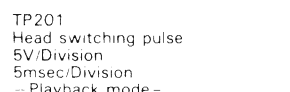
TP203
Playback preamp. signal
50mV/Division
5msec/Division



Connector BA 4, 5 pin
(Between Audio erase head and
Ground.)
10V/Division
10 μ sec/Division
—Record mode—



TP201
Head switching pulse
5V/Division
5msec/Division
—Playback mode—



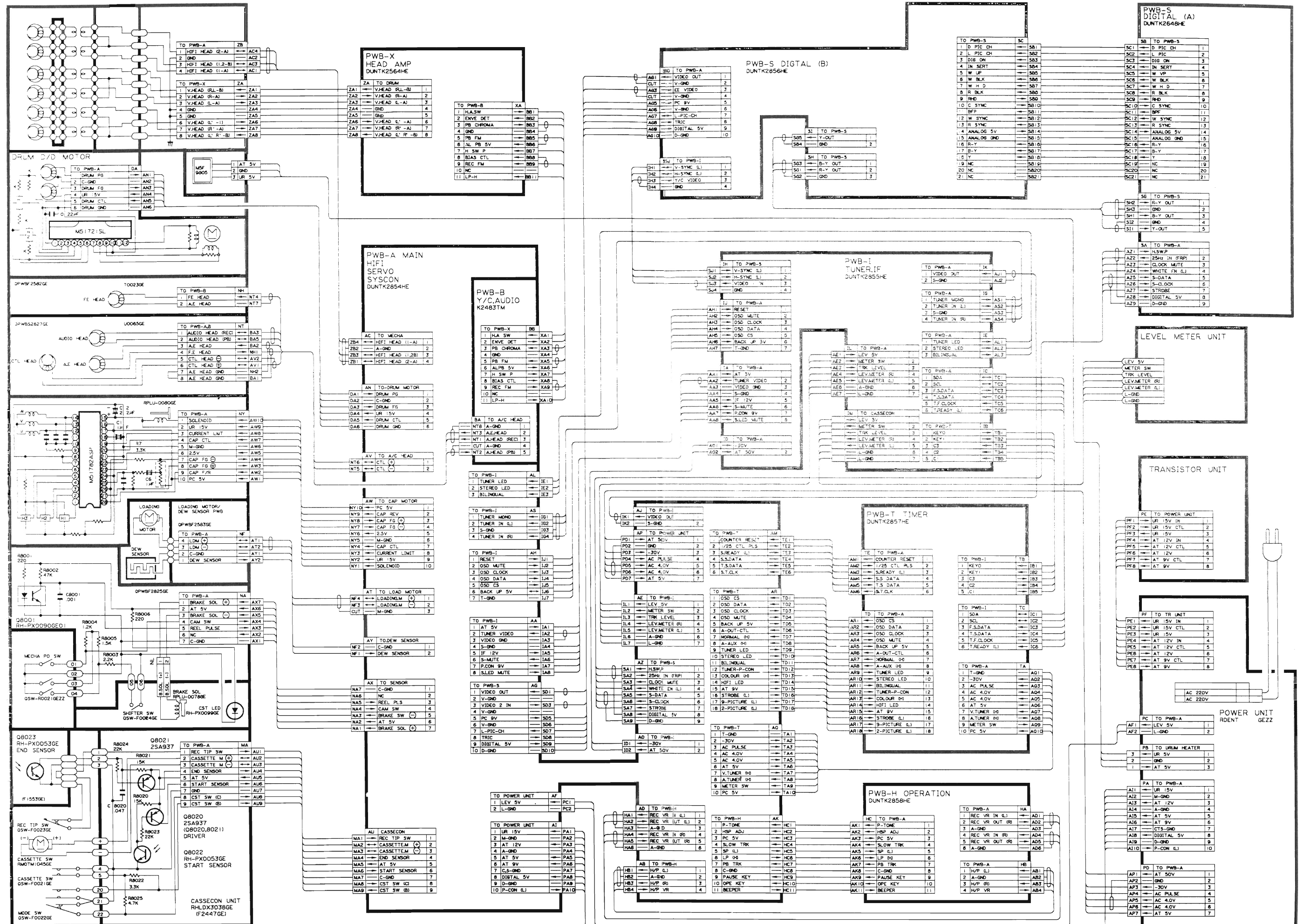
TP201
Head switching pulse
5V/Division
5msec/Division
—Playback mode—



Left Channel Playback
Left Channel Record
Left Channel EE Video



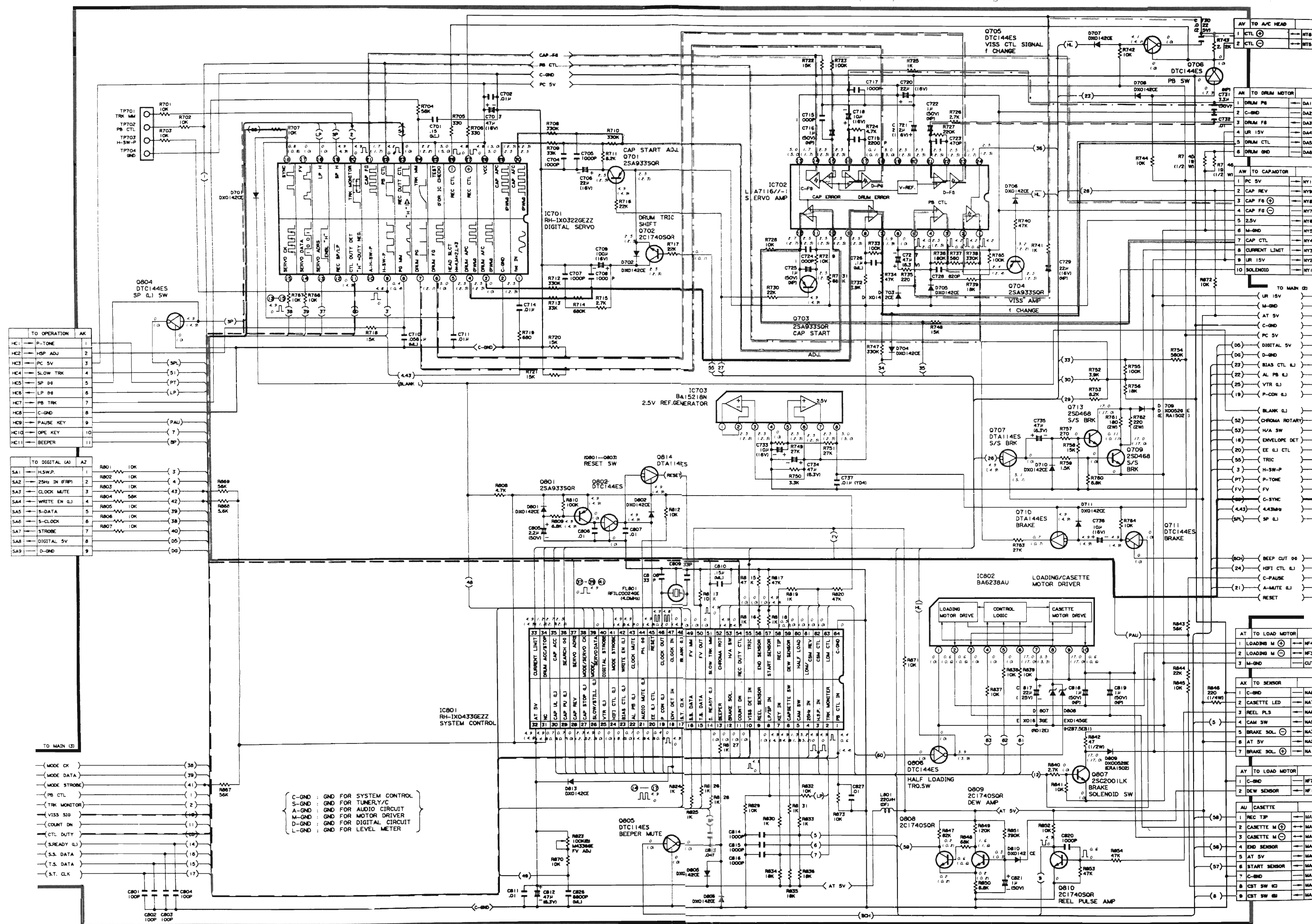
Right Channel Playback
Right Channel Record
Right Channel EE Audio

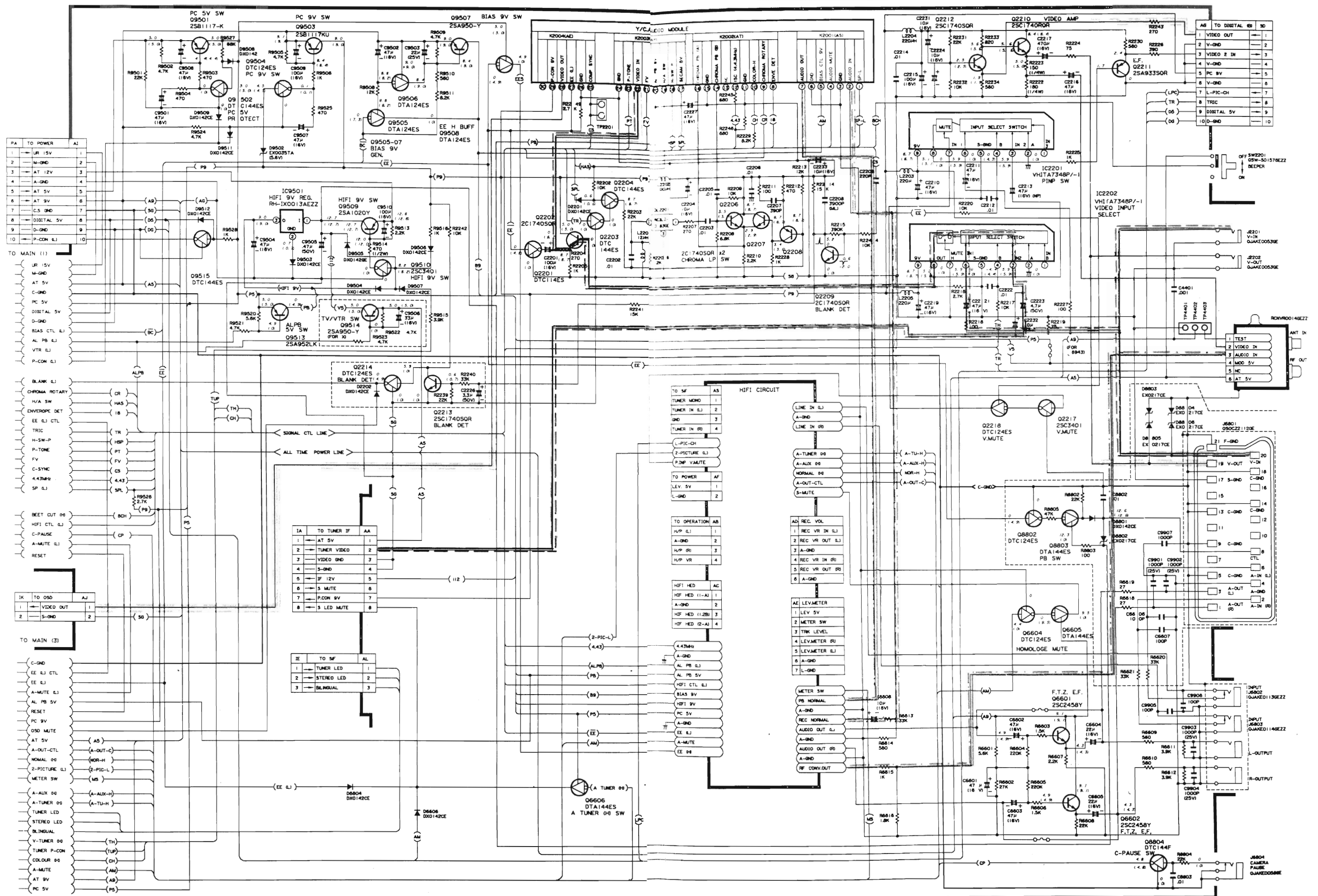


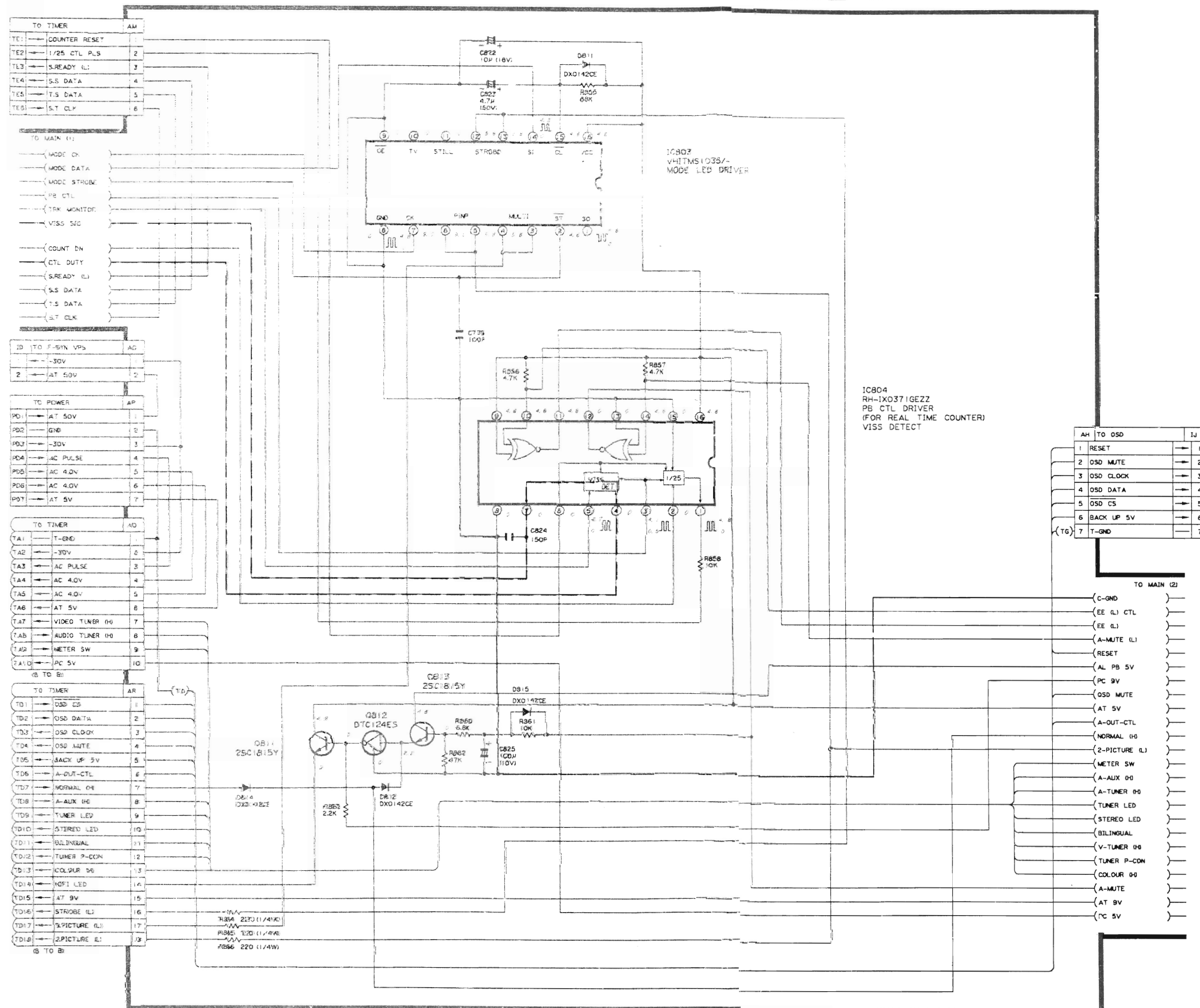
Drum phase reference signal

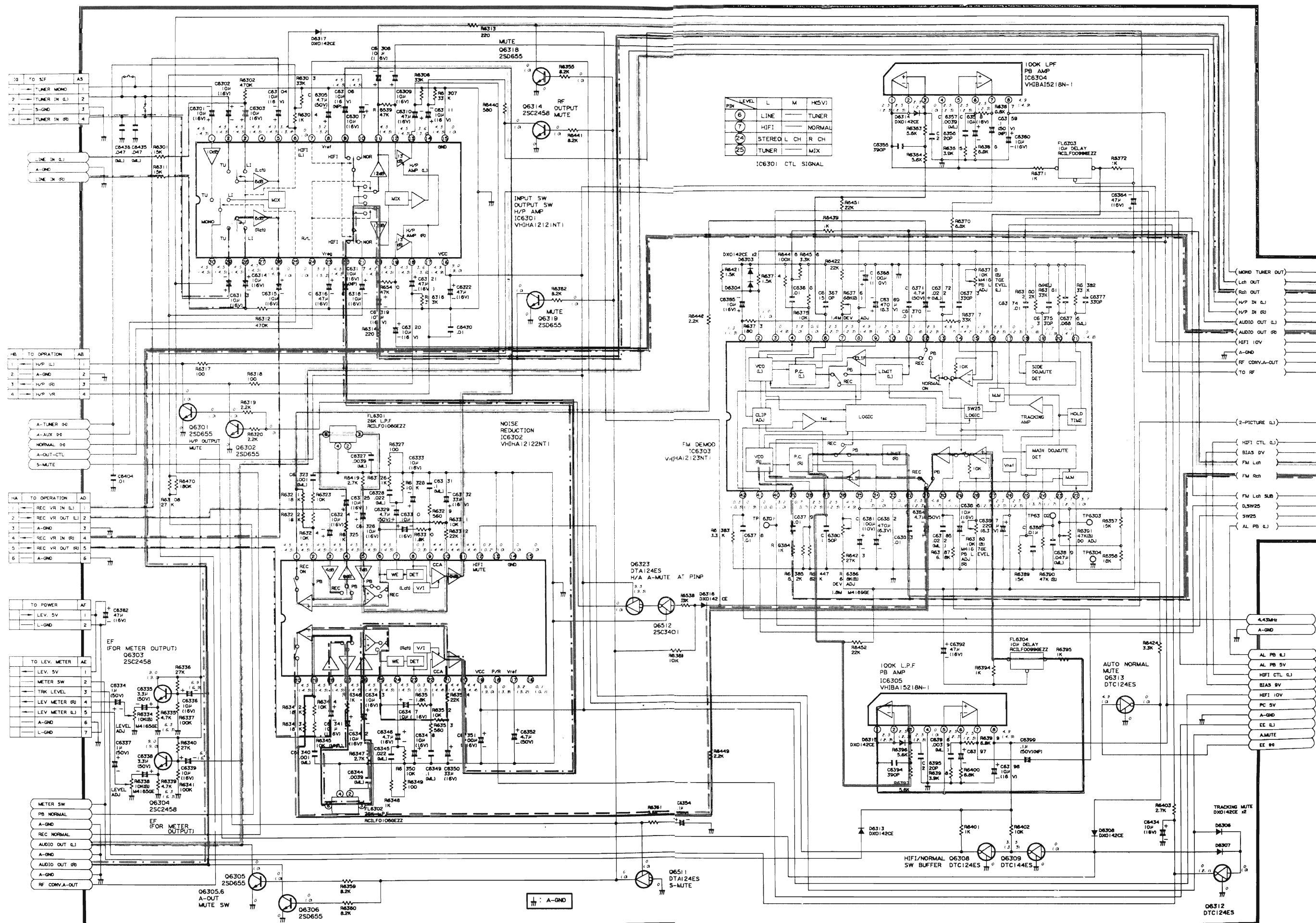
Capstan phase reference signal

VISS

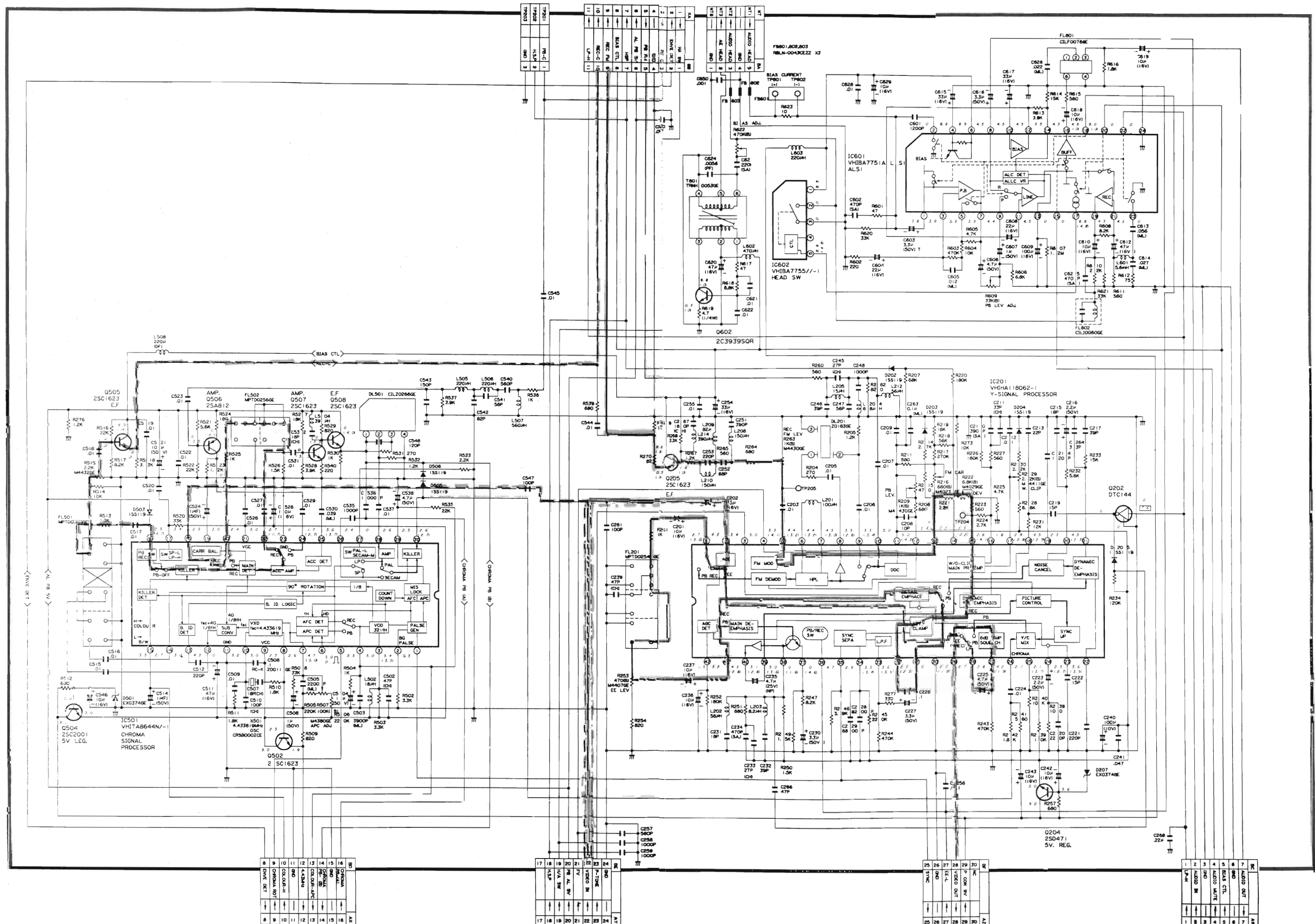




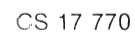


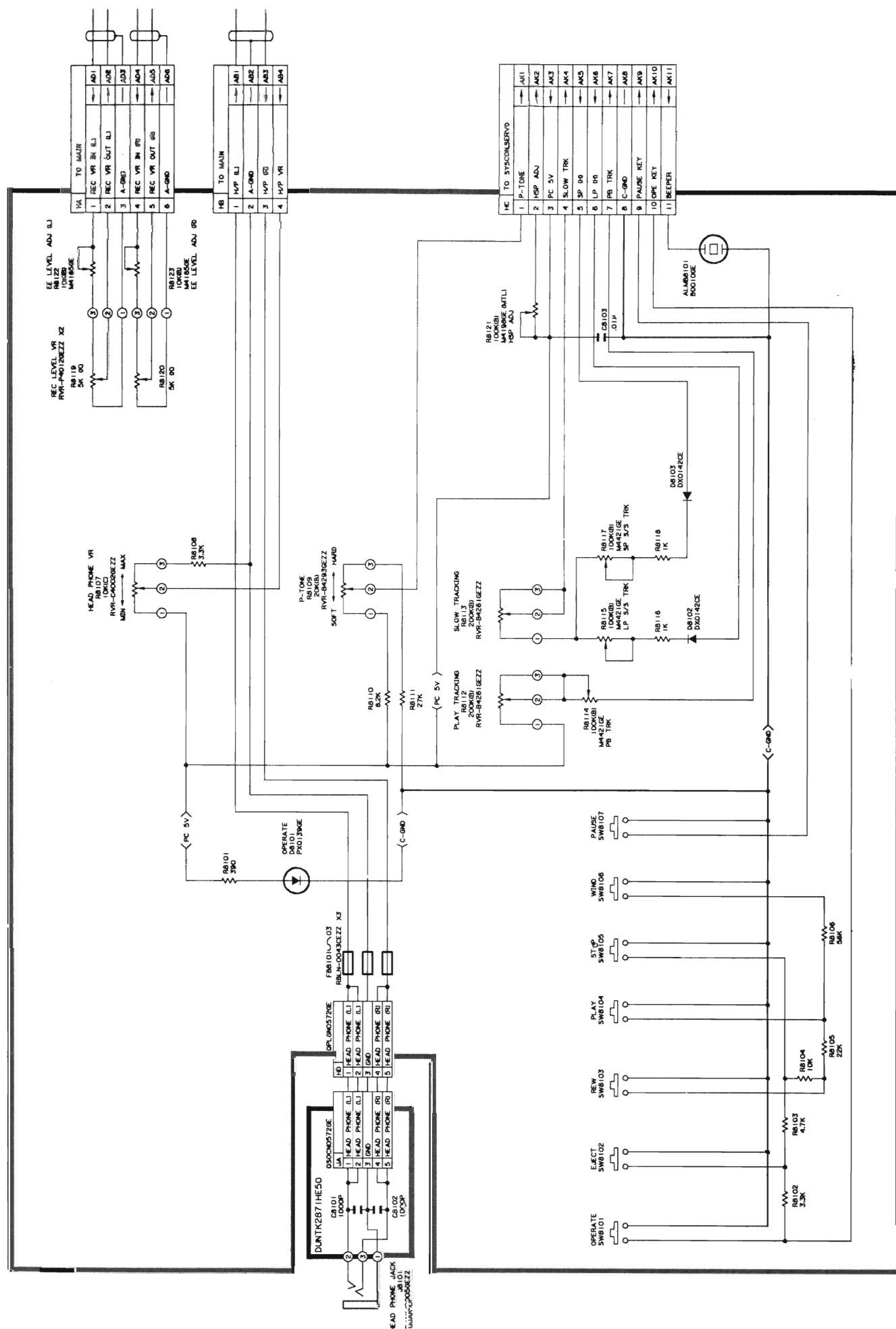




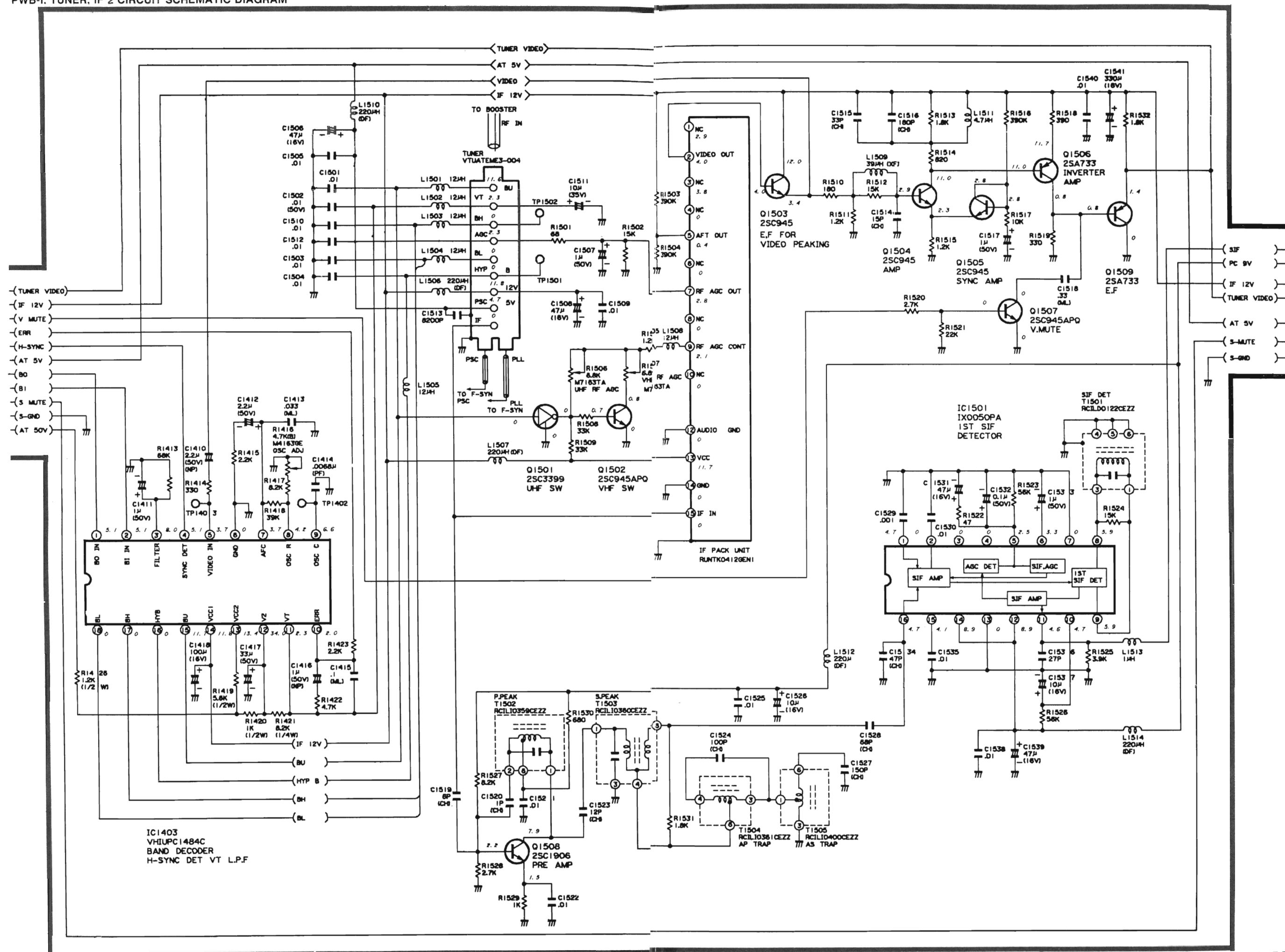


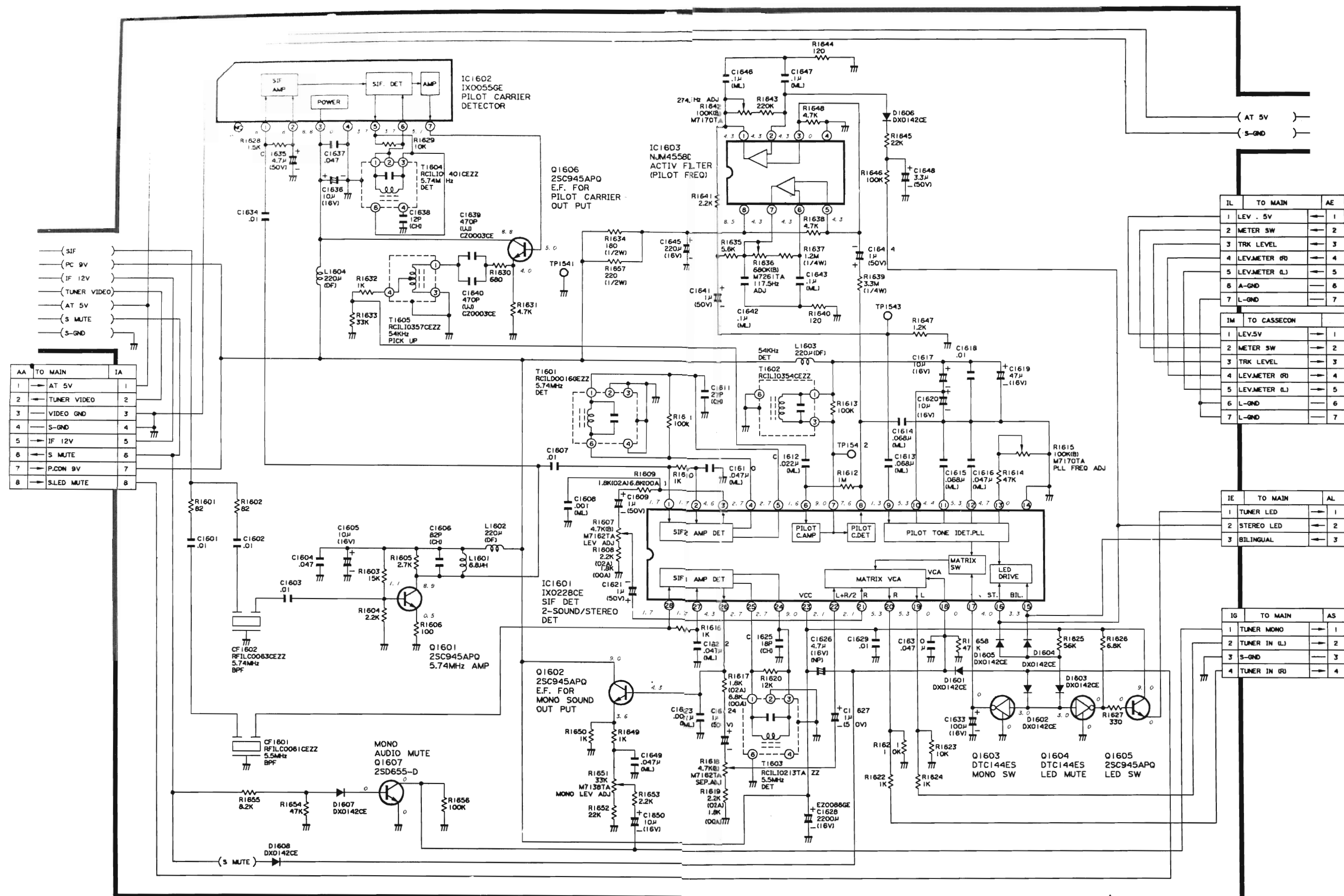
Record Luminance signal
Record Chrominance signal
Video E-E signal

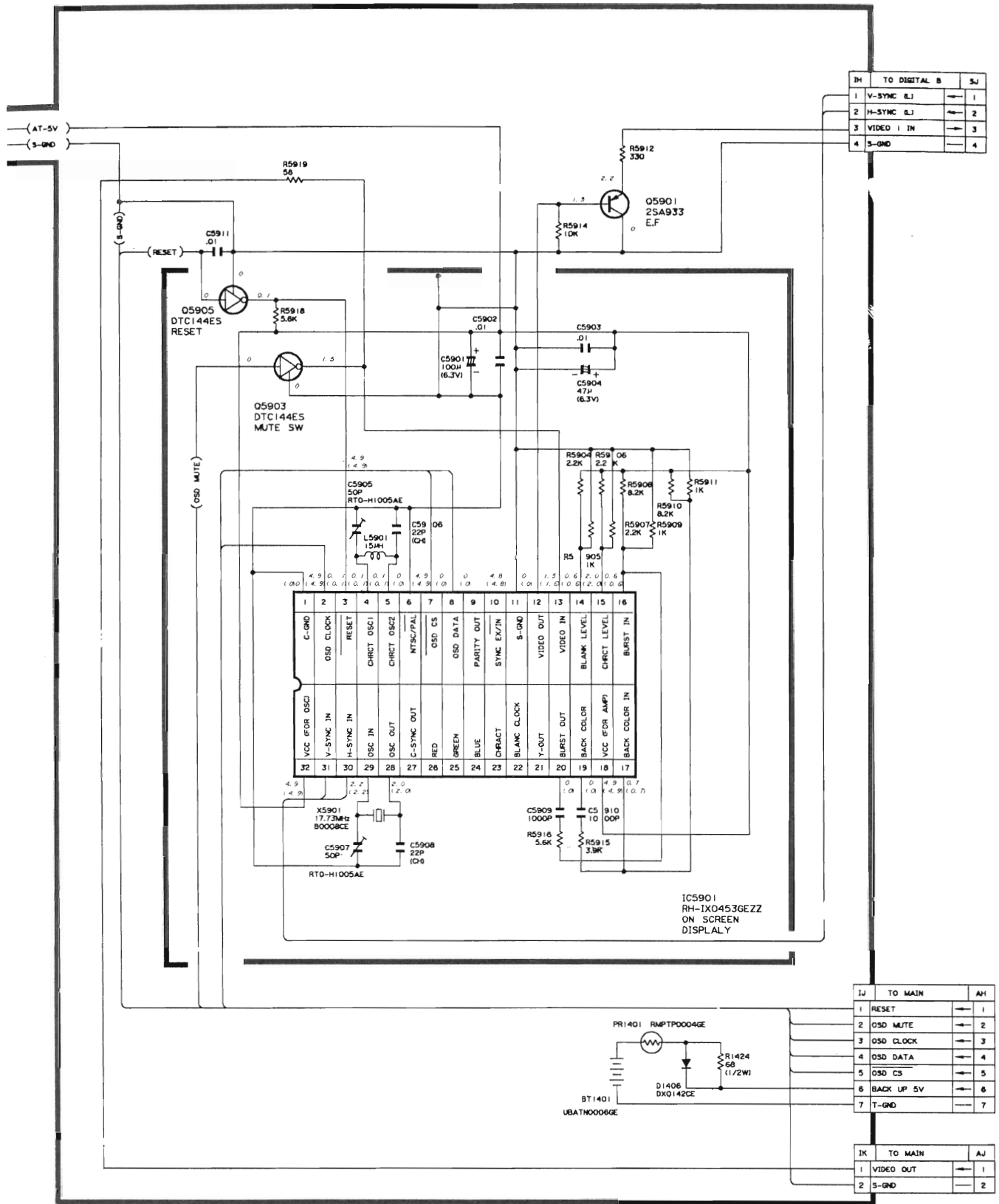


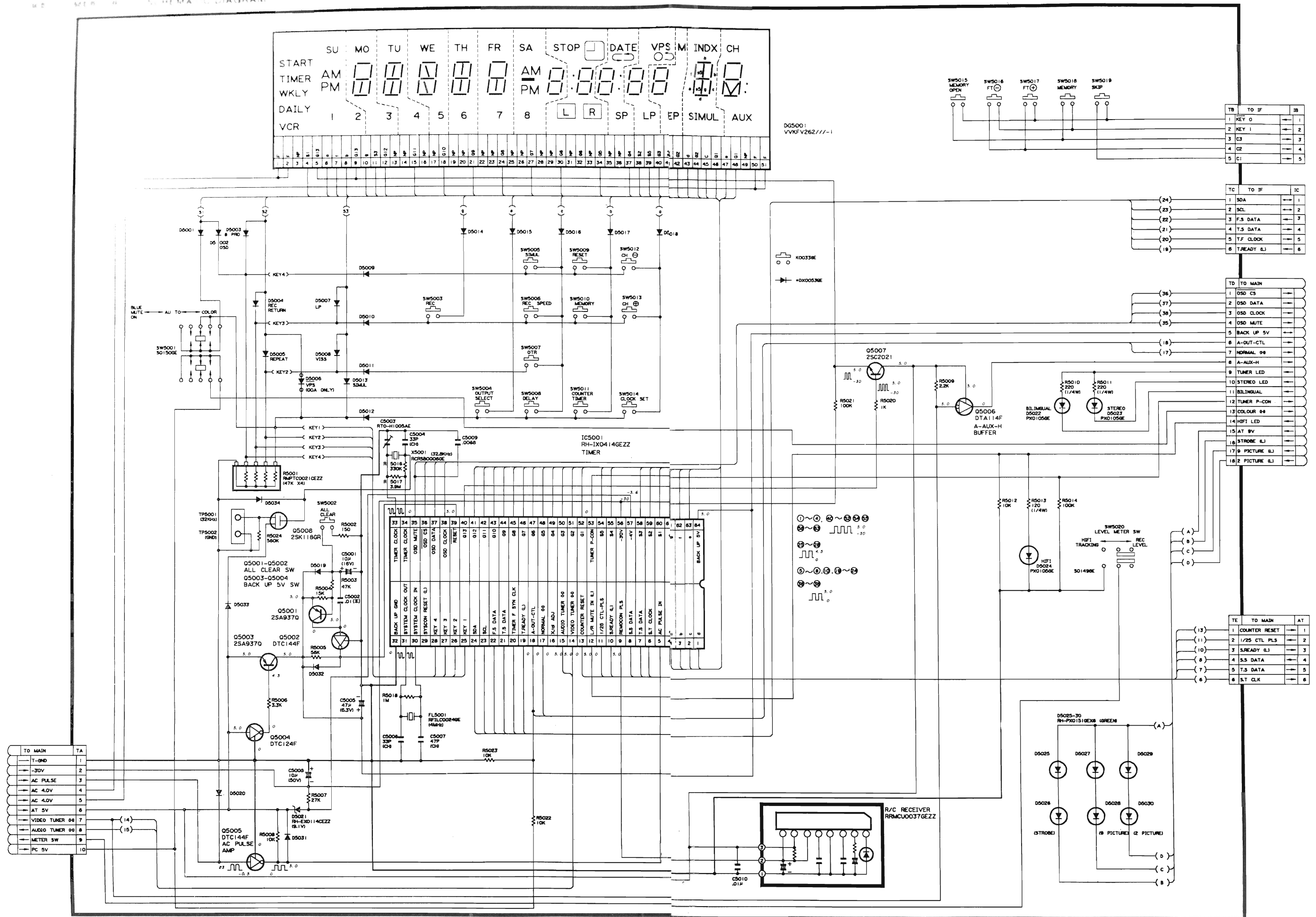


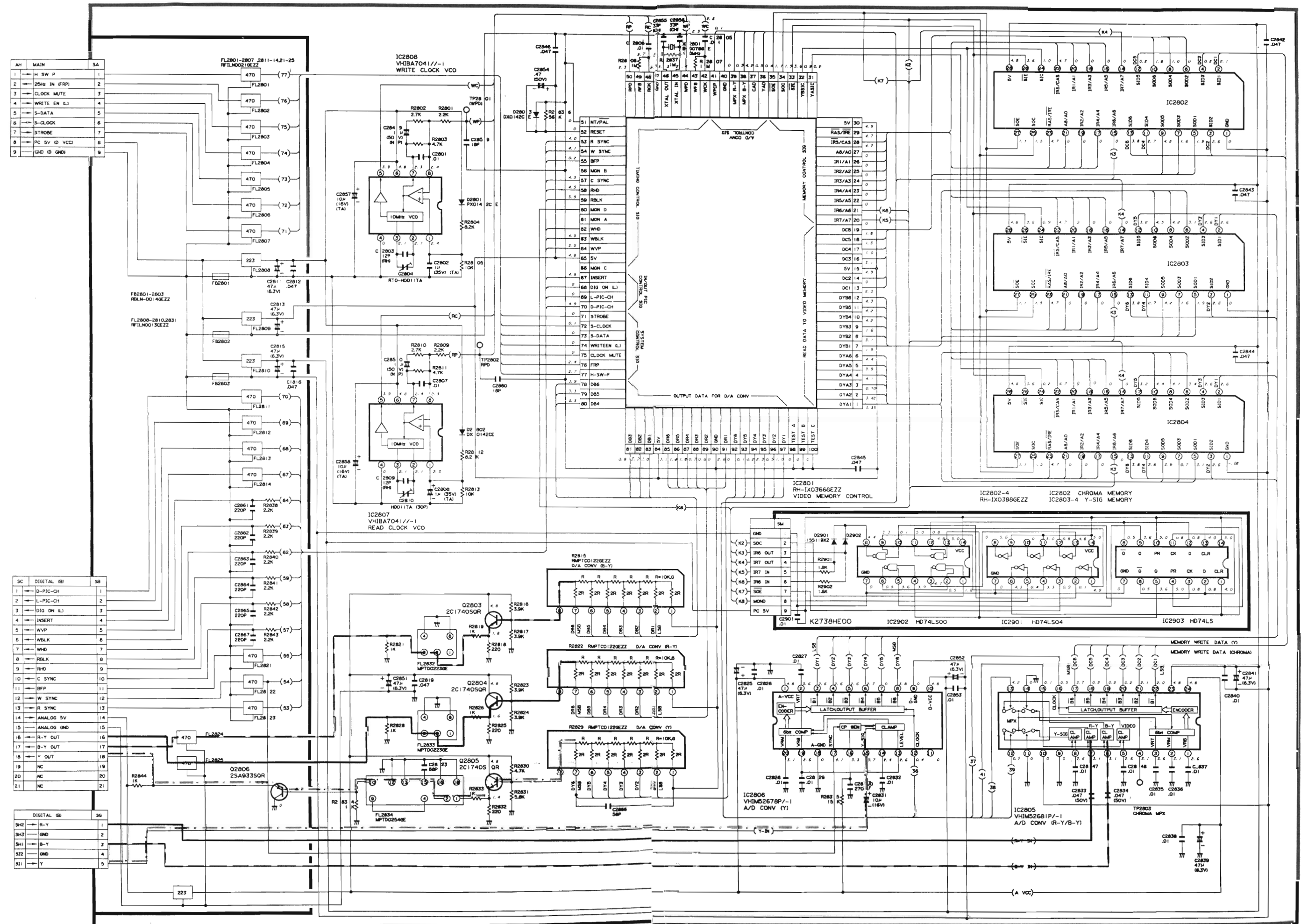


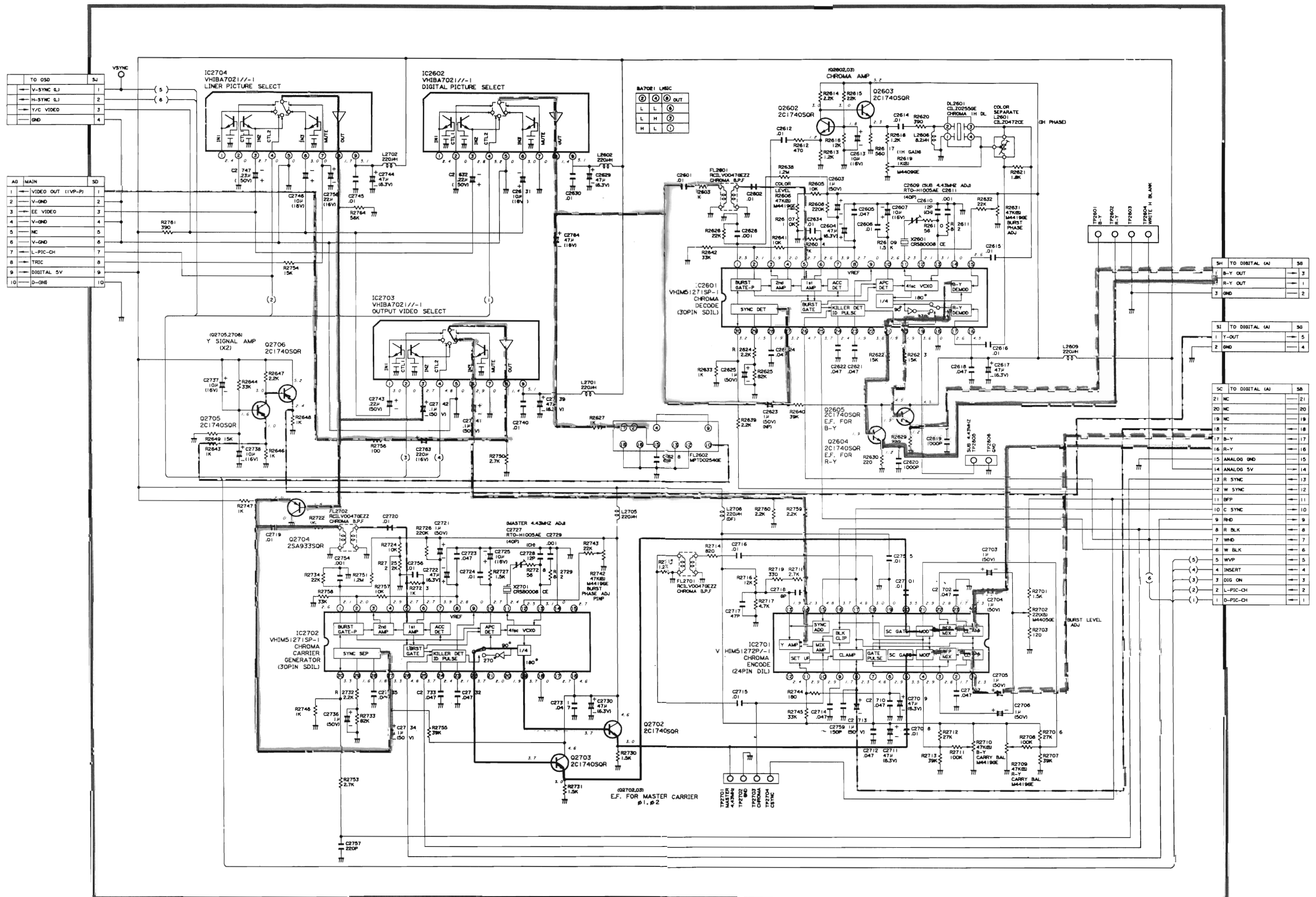
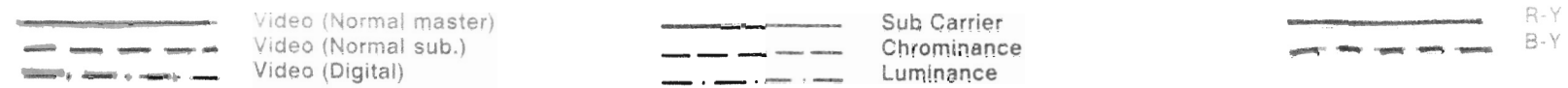


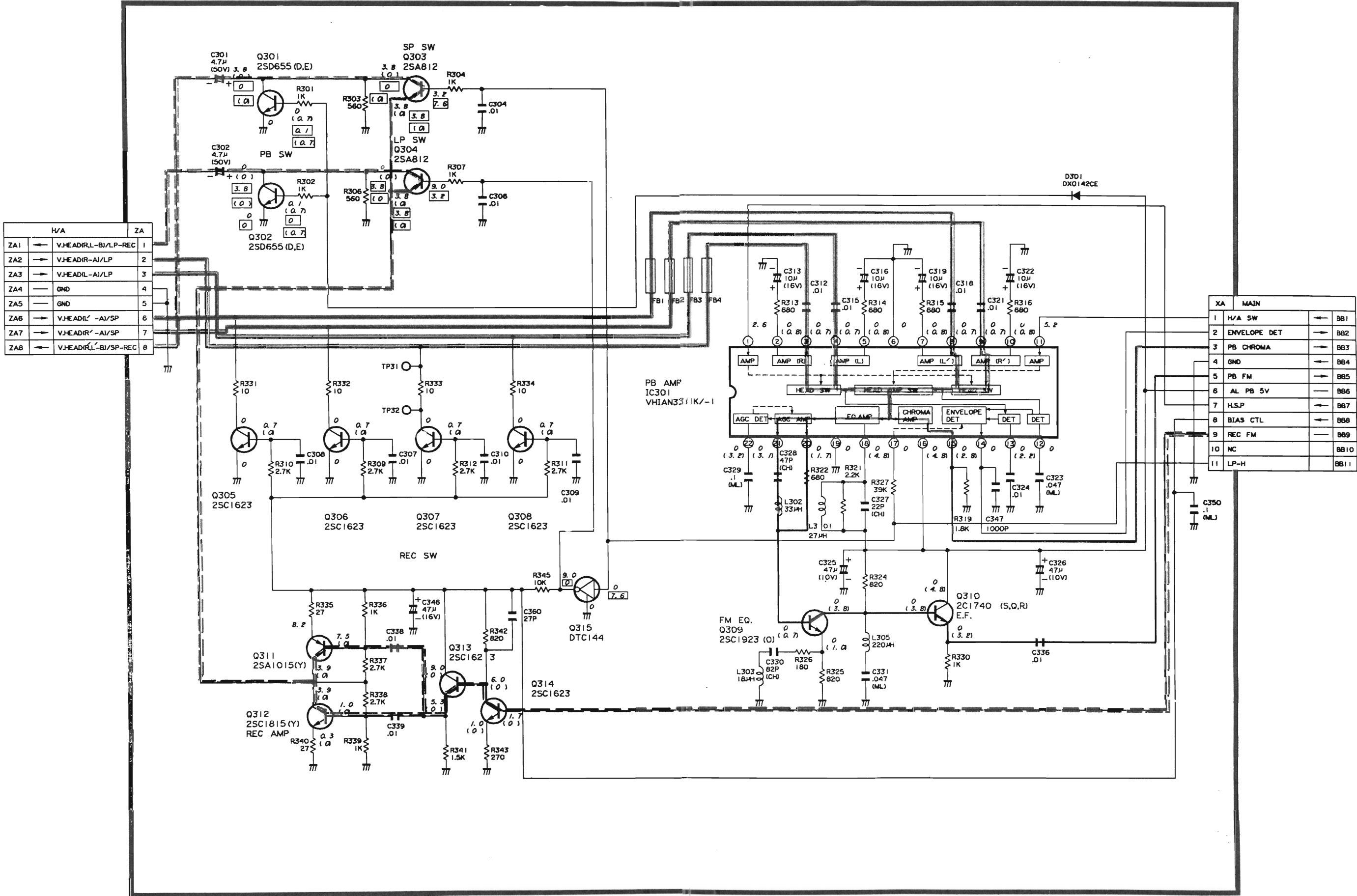


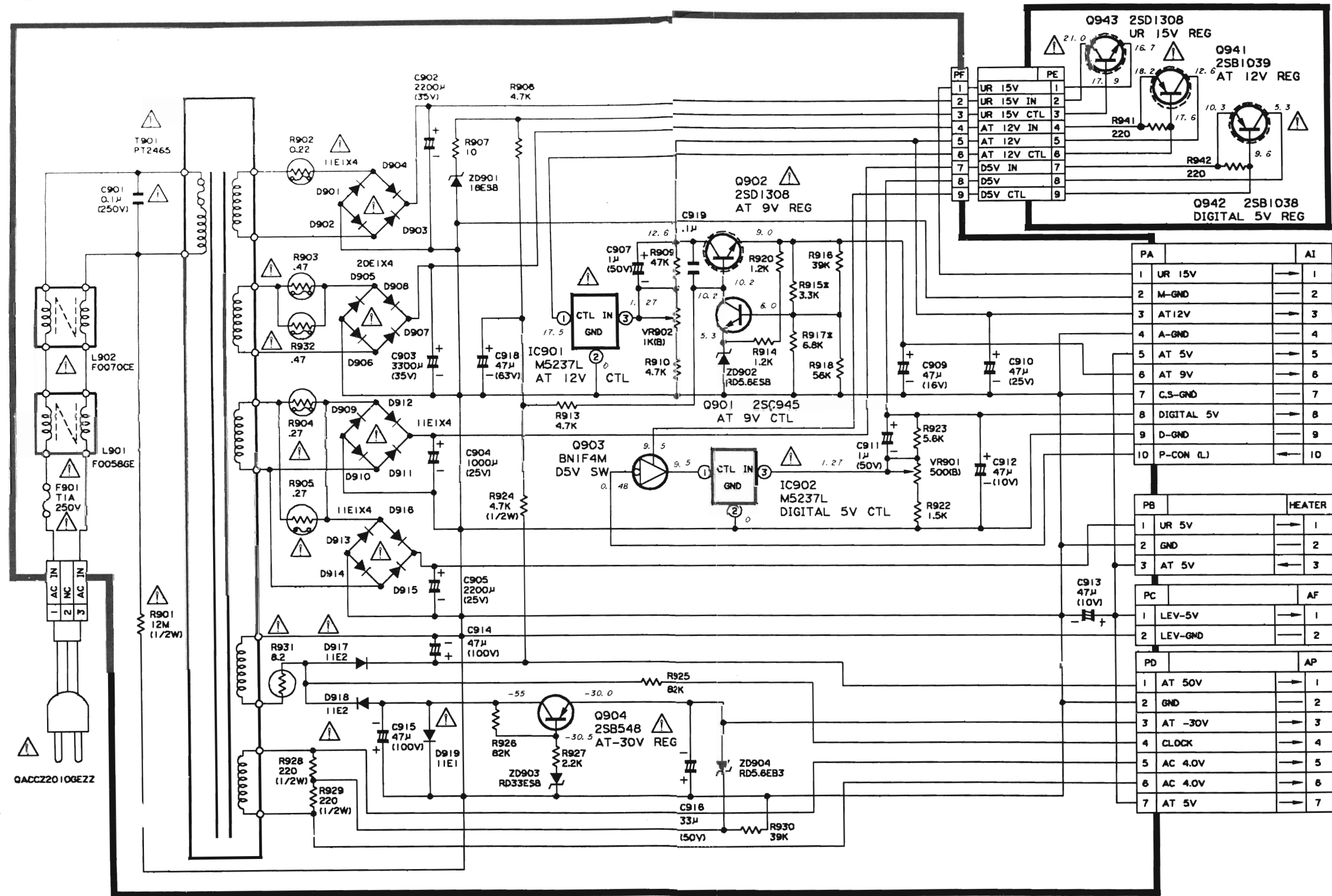


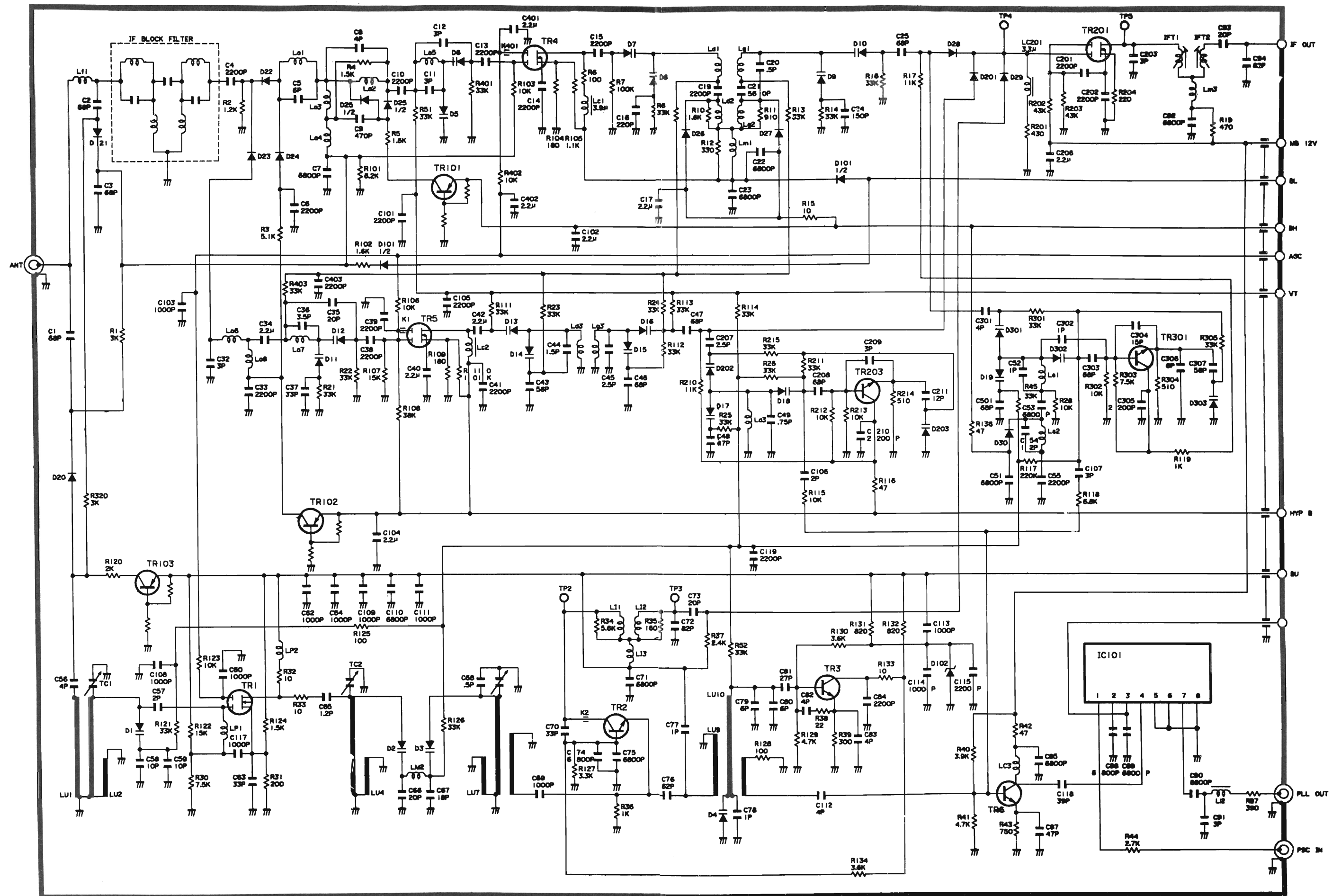


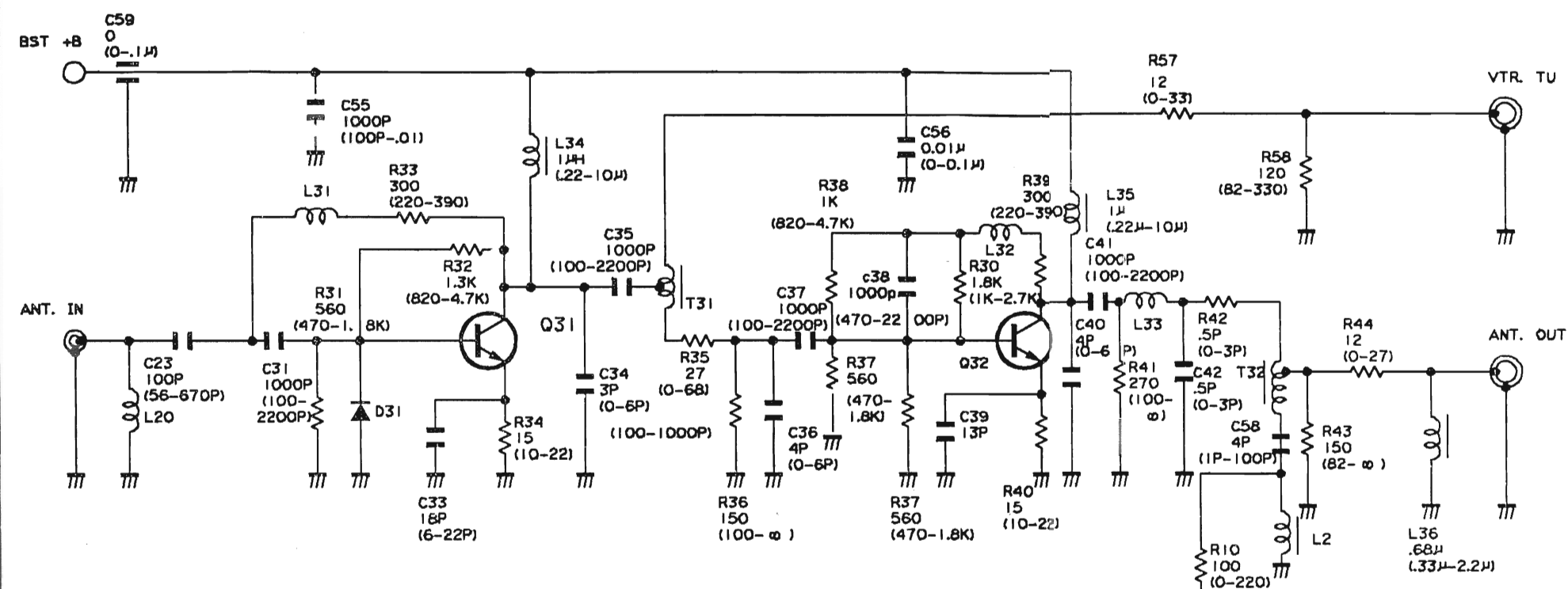




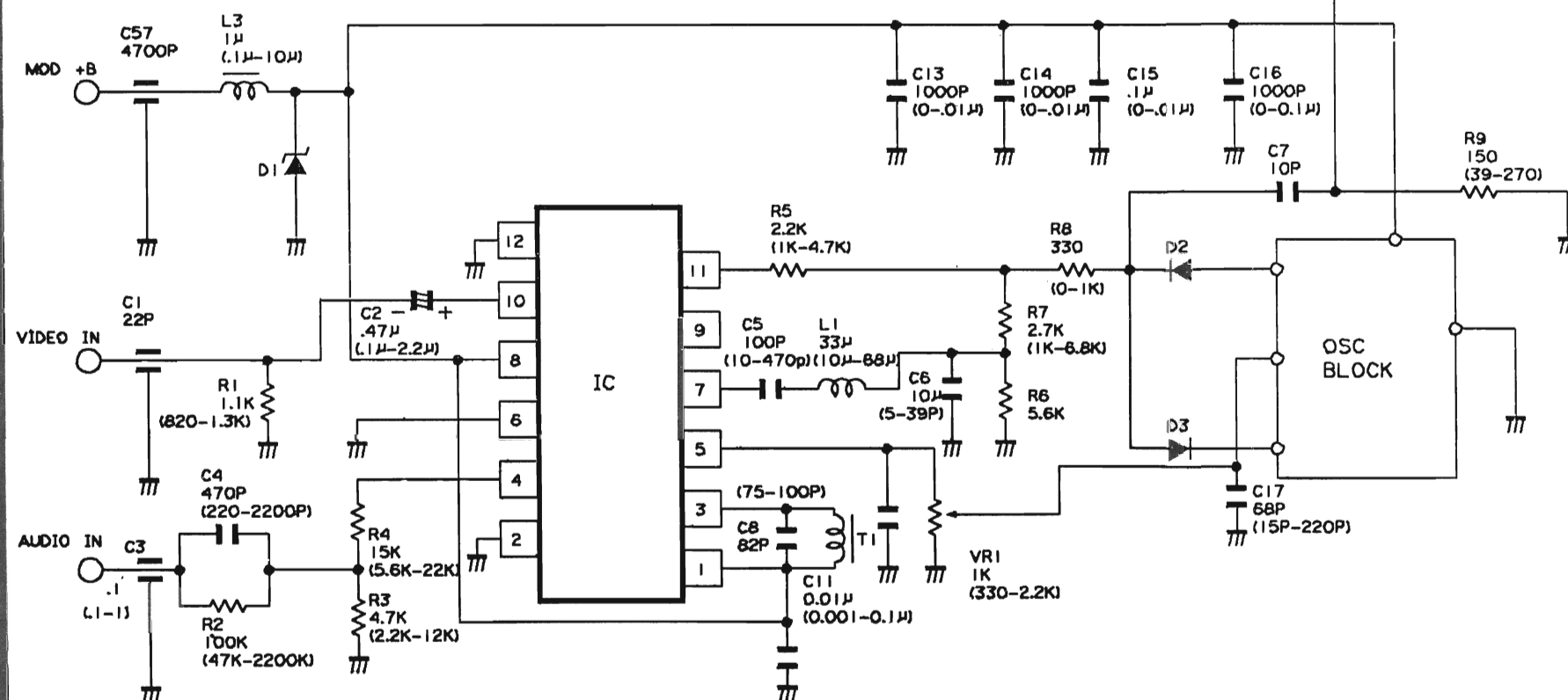




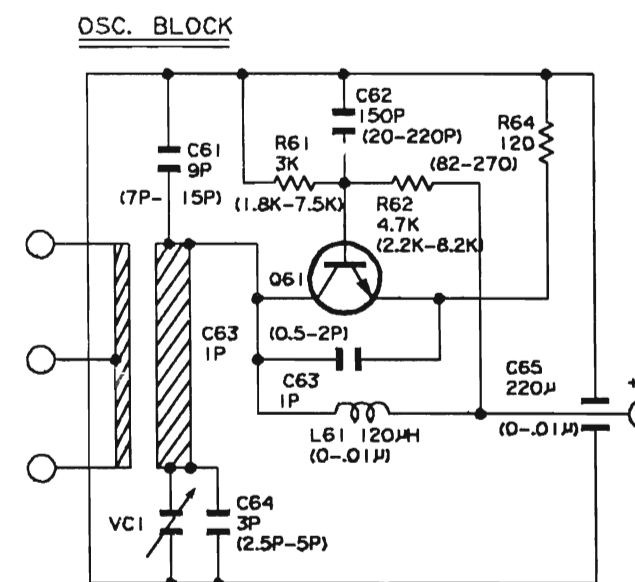


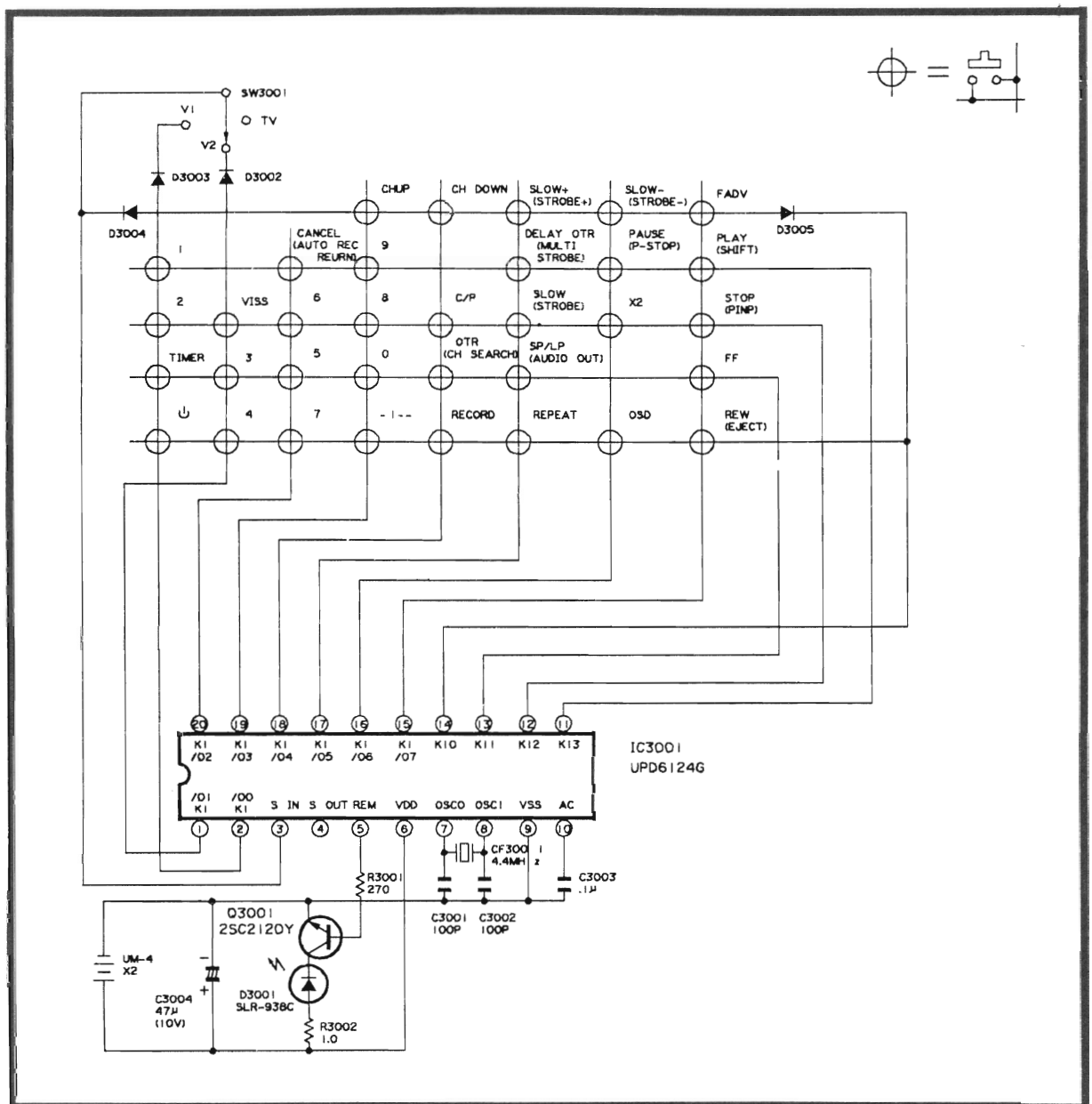


- NOTE
1. Q31, Q32 2SC3355 2SC2570
 2. TC1 AJ7080 RD5
 3. D61 2SC2480 or EQUIVALENT
 4. D2, D3 HSM276 or EQUIVALENT
 5. D31 ISS113, ISS83 or EQUIVALENT



- UNIT
1. RESISTOR Ω
 2. CAPASITOR F
 3. INDUCTOR H





IF UNIT SCHEMATIC DIAGRAM

